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REMEMBER THESE DATES

Michigan Industrial Education Society Convention to be held at Flint, Michigan, April 14, 15, and 16.

The Eastern Arts Association Convention to be held at New York City, April 19, 20, 21, and 22.

The Western Arts Association Convention to be held at St. Louis, Missouri, May 3, 4, 5, 6, and 7.

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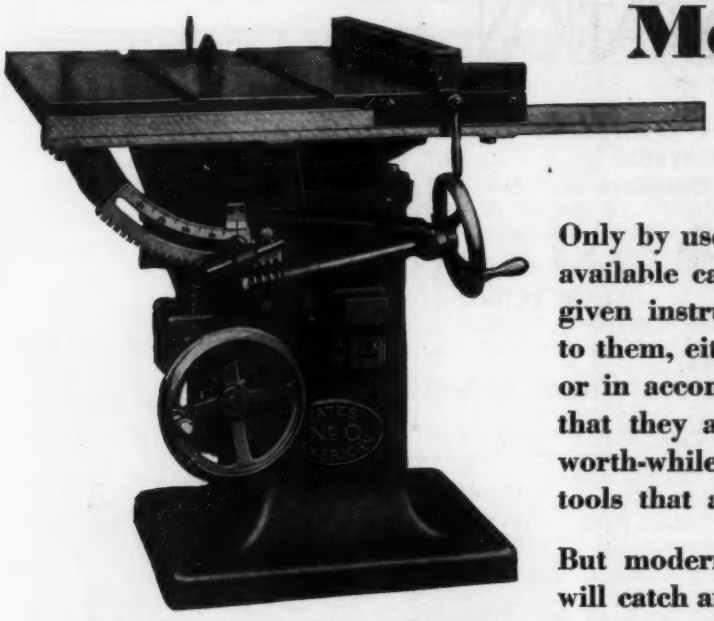
THIS MONTH'S COVER

This month's cover shows two stalwart timbermen, armed with keen axes, commencing the undercut preparatory to the felling of a large tree on state land near Radnor, Montana.

Photo by K. D. Swan, courtesy U. S. Forest Service.

Modern Instruction Demands Modern Tools



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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

VOLUME 21 MARCH, 1932 NUMBER 3

A Study of School Shops for the Junior High School[1]

*Orville A. Tearney**

WHEN shopwork was first introduced into the public schools, school buildings were closely surveyed with a view to finding out how much space was available for this new subject. It was a matter not so much of finding suitable rooms as of finding rooms that could be adapted, even in a small measure, for this purpose; and as basements were not ordinarily used for classroom purposes, they provided most of the available space. The result was that, at the outset, most of the shops were placed in basements. Again, there may have been the feeling that a basement was the proper place for shops, at least many of the new buildings at that time reserved space in the basement for the shops. The large demand for floor space, the desire to be economical, and the fact that many of the shops had been placed in basements, all combined to fix the custom of placing the shops in the basement.

Of course, it is not strange that most basements in old buildings and even in many new buildings, are ill adapted to workshop purposes. Poor lighting and poor ventilation, with low ceilings and lack of storerooms, locker rooms, and insufficient floor space, all contribute to the impracticability of using the basement for shopwork purposes. It is doubtful whether instruction rooms of any kind should be placed below the ground line.

With the movement for a more scientific education, with the advent of the junior high school, and with the demand for health education, has come a thorough scrutiny of the school plant. Many progressive communities have built junior-high-school buildings, keeping in mind the comfort and health of the children as well as the conditions conducive to efficient instruction. The Carlos M. Cole Junior High School, of Denver, the McKinley Junior High School, of Los Angeles, the Memorial Junior High School, of San Diego, the Roosevelt Junior High School, of Appleton, Wisconsin, are all splendid examples of modern school plants.

Location of Shops

Proper lighting and ventilation are vitally necessary in a room in which technical work is performed. The best kind of light to prevent injury to the eyesight is a good flood of sunlight; proper ventilation can be secured only through a good supply of fresh air. Pure air is especially needed in a shop where physical action burns up tissues, which can be replaced only with oxygen from the air. It is primarily important, therefore, that the location of the room shall be such as to provide an abundance of sunlight and of pure air.

TABLE I. Location of 141 Woodworking Bench Rooms in 141 Junior High Schools, Location Designated With Respect to Floor and With Respect to Directions

Location as to Floor	*Number of Shops for Bench Woodworking*	*Percentage*	*Location as to Direction*	*Number of Shops for Bench Woodworking*	*Percentage*
Column 1	*2*	*3*	*4*	*5*	*6*
1. Basement	60	42.55	Northeast	34	24.11
2. First Floor	75	53.19	Northwest	44	31.19
3. Second Floor	6	4.25	Southeast	46	32.62
4. Third Floor	0	0	Southwest	17	12.05
Total	141			141	

Rooms having east and southeast exposures receive abundant sunlight during the forenoon session, which is the long school session, and for that reason are most desirable for shopwork. Rooms with north and west exposures receive light from the setting sun in the afternoon, and therefore need a larger lighting area.

Table I, item 3, column 6, shows that 32.62 per cent

[1]Extracted from a study by Orville A. Tearney at Colorado State Teachers College, Greeley, Colorado, during 1930 and 1931, on *Physical Equipment and Courses of Study in Woodwork in the Junior High School.*

*Director of Industrial Arts, Southeast Missouri State Teachers College, Cape Girardeau, Missouri.

of woodworking shops on which reports were submitted, are located in southeast rooms. Item 1, column 6, of the same table, shows that 24.11 per cent of shops which reported, are located in northeast rooms, thus giving 56.73 per cent of the shops east sunlight.

As to location, item 2, column 3, of the same table shows that 53.19 per cent of the shops are on the first floor, and item 3, column 3, shows that 4.25 per cent of the shops are on the second floor, leaving fewer than half the number in the basement and none above the second floor. With more than half of the shops studied, receiving east sunlight, and with more than half of them located above the ground line, it is evident that much intelligent consideration is being given the location of shops.

Shop Lighting

A closer study of lighting conditions, indicates that of all the schools reporting the lighting or glass area in bench woodworking shops averages 14.16 per cent of the floor area. This does not appear to be quite sufficient, as authorities indicate that the glass area should be approximately 20 per cent of the floor area. In west rooms for afternoon lighting an even greater percentage would be desirable.

Although more than one half of the shops that have sent in their reports have an advantageous location with regard to the ground line, less than one half have an abundance of light area.

To give proper interpretation to the foregoing facts regarding illumination, it must be remembered that the data incorporated in the reports are taken from every section of the country. Sunlight varies in intensity in different parts of the States: in consequence, buildings located in the northern and eastern states should be provided with a larger glass area than those located in the southern states where the sun is more intense.

Moreover, many of the buildings studied are old structures; and the rooms used are makeshifts rather than rooms specially designed for shop purposes. In the report of one school it is shown that in one bench room the glass area is only 1.17 per cent of floor area. Of course, in this case there was no intelligent planning at all.

The vital question at this point is a matter not so much of the present condition of shoprooms as of future improved conditions. The important thing to ascertain is whether school authorities have ample information on this subject and are making reasonably successful and conscious effort at improvement. There is objective evidence that school administrators are making a vigorous, intelligent effort to supply better shoprooms for woodwork in the junior high school.

Floor Space

The minimum floor space necessary for a woodworking shop is simply a mathematical problem depending on two factors, namely, the number of pupils to be taught during a class period, and the type, size, and extent of equipment to be operated. In order to supply a basis for comparison, ten shop layouts that had been worked out by experts in six states widely separated, were studied. These shops may not be ideal, yet they are sensible layouts that point to reasonable efficiency.

From these it appears that the minimum square feet of floor space per pupil is 35.93; that the maximum square feet of floor space per pupil is 88.62; and the average amount of floor space per pupil is 64.90 square feet. This average amount of space per pupil is approximately an area of eight feet by eight feet, which is a very liberal area.

A further examination of these ten shop layouts shows that the average number of square feet of floor space is 1,461.60. The average number of square feet of floor space in the 155 woodworking bench rooms reported upon, is 1,468. Comparison of the two immediately preceding items indicate a striking correlation.

It is fair to conclude that junior high schools have on the average sufficient floor space for woodworking purposes.

Operation Rooms

All the operations essential to woodwork may be done in one room sufficiently large. But many woodworking instructors desire a separate room for each of the major processes; namely, hand-tool or benchwork; wood finishing; and the operating of power machines.

Of the 155 junior high schools that have reported the execution of some form of woodwork, 141 report separate areas for woodworking benches as is shown in Table II, item 1, column 2. Fourteen schools report that the benchwork is conducted along with other mechanical activities in what has recently become known as a general shop.

TABLE II. Of 155 Junior High Schools Reporting, Number and Percentage Having a Separate Room for Each of Four Purposes in Woodworking

Names of Rooms	*Number of Junior High Schools Having Each of These Rooms*	*Number of Junior High Schools Not Having Each of These Rooms*	*Percentage of Junior High Schools Having Each of These Rooms*
Column 1	*2*	*3*	*4*
1. Woodworking Bench Room	141	14	90.96
2. Wood-Finishing Room	81	74	52.25
3. Woodworking General Tool-room	66	89	42.58
4. Woodworking Power-Machine Room	43	112	27.73

A finishing room well lighted and free from dust is practically a necessity. In fact, it is impossible to do excellent wood finishing without such a room. A reference to Table II, item 2, column 4, shows that 52.25 per cent of the schools reporting have such separate finishing rooms.

Table II, item 3, column 4, shows that 42.58 per

cent of the junior high schools reporting have general toolrooms, and item 4, column 4, shows that 27.74 per cent of the schools studied have power-machine rooms.

Summary

Rooms used for woodworking purposes have been studied with the following points in mind: location with regard to ground line and with regard to geographical direction; ratio of lighting area to floor space; average amount of floor space; and number of operation rooms.

More than half of the woodworking shops are located advantageously with respect to both ground line and geographical direction. The ratio of glass area and floor area is not so favorable. The range is large — from 1.17 per cent to 60 per cent. In less than half of the schools studied, is the glass area as much as 20 per cent of the floor area.

On the average, sufficient floor space is provided for woodwork. This study indicates that the approximate average floor area supplied for each pupil is a space equivalent to a square 8 by 8 feet. This is indeed liberal.

Of the 155 junior high schools studied, 141 have bench rooms, 81 have finishing rooms, 66 have general toolrooms, and 43 have power-machine rooms. The 14 schools not having bench rooms, do their benchwork in a general shop.

The significant question answered in this study of woodworking rooms is, are the present conditions the result of accident or of study, careful planning, and accumulated information. Of course, there are old buildings which were designed with not even the remotest thought in the architect's mind of ever using them for shop instruction; and again, there are newer buildings in the construction of which there was little intelligent planning relative to shop requirements. But there is, nevertheless, objective evidence that administrators have accumulated much valuable information on the subjects of lighting, ventilating, and location, and what is vitally important, that they are using their knowledge in the designing and the constructing of woodworking shoprooms for the junior high school.

The Ideal Vocational Teacher, An Industrial Viewpoint

*C. J. Freund**

ALTHOUGH the apprenticeship session of the American Foundrymen's Association Convention had come to a close, and the chairman and secretary of the session had marched out of the hall, carrying their gavel and portfolio, respectively, the crowd still remained and the room resounded with the din of eager discussion by groups of four and five who felt the need of telling each other everything they had been unable to say during the session. They dispersed very gradually as one member after another remembered another engagement or hurried out to lunch in order to be on time for the events of the afternoon.

Finally, at twelve-thirty, the apprenticeship committee called it a day and straggled through the rain to the Auditorium Hotel across the street where a large, oval table had been reserved for their luncheon. They would not be together again until the autumn meeting of the committee at Chicago. They talked of many things, the slow growth of the apprentice-training movement in the foundry industry, the effect of the machine age upon trade skill, the comparative unpopularity of the foundry industry among modern young men, the attitude of foundrymen in general toward training, and the session which had just closed. The attention of the group finally concentrated on the relation of vocational teaching to apprenticeship and on this subject they remained until three or four of the members excused themselves and bade the others good-by.

*Apprentice Supervisor, The Falk Corporation, Milwaukee, Wisconsin.

By two o'clock only four remained, the chairman of the committee, the manager of a New Jersey steel foundry, the educational director of a large midwestern machinery-building corporation, and the professional secretary of a prominent local foundrymen's association. Conversation had drifted from vocational education to vocational teachers and their qualifications, and each man in turn projected his ideas into the dense cloud of cigar smoke which hung about the table. The New Jersey man was speaking.

"I know a man whom I consider an ideal vocational teacher. I first met him in the Navy, aboard the destroyer *Alert*, just after the Armistice. We were returning to the United States after many months of wet and cold service in the North Sea. As the war was over, we relaxed considerably and one night in the ward room, those of us who were not regular naval officers compared notes to see what our occupations were in civil life. One young ensign said he was a student and surprised us by announcing that he hoped to become a teacher in some line closely related to industry. We thought that was a queer field to go into permanently, but we had different ideas about the teaching profession in those days.

"I next saw him five years ago in our vocational school where he has charge of the machine shop and mechanical divisions. He has nothing to do with our foundry boys, but I got to know him quite well because we played handball together at the Y.M.C.A.

"Of course, it is from my viewpoint, the industrial viewpoint, that I call him an ideal teacher. I don't know how he stands with his principal or whether or not he fulfills the technical requirements of his profession; I don't know anything about such matters. But I do know that he gets results with his boys because any number of friends of mine who operate machine shops praise his work very highly.

"There are a number of things about this teacher which stand out. In the first place, he is full of enthusiasm for his work, his business of teaching, and his subject. I have never heard him complain against anything that was not to his liking. I suppose there are many things in his daily life which go against him, but he seems to think that the advantages much more than compensate for the drawbacks so that the drawbacks dwindle into insignificant details.

"He does not teach mechanically, doesn't merely come into the room and go through the motions of covering a certain number of lesson units or whatever you call them, or going through so and so many pages of a text. The instant he comes into his classroom, his dynamic personality gives new color and life to the place. By his energetic and graphic illustrations he makes the dullest explanation of screw threads and cams as interesting as a story. The students like his classes, although he gives them a great deal of work, and some of them have even attended on days on which their attendance was not required. Apprentices in some of the shops have given up their noon hour, or most of it, in order to talk about assignments and problems which he had given them to work up. He brings to his work the attitude of the fiery football coach or the peppy chamber-of-commerce manager.

"But don't misunderstand me; subject matter is not the most important item to this teacher. His greatest interest is his boys.

"I have known vocational teachers, many of them, who conscientiously read every book and every magazine article which had the slightest connection with their profession, went to all the conventions and were able to talk about vocational education in terms which a mere layman like me could not even understand. They placed all emphasis on content and methods and all that sort of thing and none on students. Boys in class were nothing to them except subjects on whom they could try out the theories they had adopted or worked out; their attitude toward students was very much like the attitude of the professor of biology toward a guinea pig. They felt that the student was always to be sacrificed to whatever they accepted at the moment as correct practice. If vocational education could have been carried on without students, it would have been so much better. I am sure that whenever they called upon a student to recite, they designated his as 'You down there, end of the row; no, not you, the man ahead of you in the third row.'

"This teacher assumes an altogether different attitude. To him the boy is the central and most important fact in vocational education and the teaching and training of the boy is by far his principal business. Methods, theories, technique, and all that are to him nothing more than a means to the end of educating the boy; everything must be subordinated and adjusted to the student.

"When I say that he is interested in his boys, I don't mean boys in the abstract or collectively. I mean the boys in his classes as individuals with their different characteristics, tendencies, and peculiarities, both favorable and unfavorable. He knows them all personally, studies them, sympathizes with them and tries to understand them. His efforts with each boy are adjusted to that particular boy's requirements.

"He often goes to extremes in helping students, goes out of his way farther than would be possible if he were not heart and soul in his work and in his boys. At one time last year he had a student who was a hard, willing worker and had an excellent record with his employer, but who found academic work extremely difficult. He gave the student a milling-machine lesson in indexing to work out, together with some problems directly related to the lesson. I do not know if the work was difficult or not and it makes no difference; the point is that the boy could not understand it. The teacher patiently explained the matter over and over but accomplished nothing; the boy could not grasp it. Then he questioned the boy carefully in order to determine, if possible, how his mind reacted and precisely where his difficulty lay. Convinced after a time that he perceived the nature of the stumblingblock, he examined the lesson and decided that if it were differently worded the student could understand it. Accordingly, he took the lesson home with him and rewrote it for the benefit of this one boy. Still he did not understand it. Again the teacher changed the wording. Finally, after the third effort, the boy saw the light and solved the problem. The instructor did not give up until he was firmly convinced that the matter was clear in the student's mind. He has done similar work for other boys.

"Another time a bright student, too bright if there is such a thing, but whose home influence was unfavorable or at least negligible, got in with a gang of low characters. He kept up his schoolwork because of his respect for the instructor but his attendance at work fell off. The instructor noticed a slight change in the general demeanor of the boy, but paid no attention to it. Suddenly matters came to a head.

"One morning the boy came into the instructor's office very much downcast and worried. He flopped down into a chair.

" 'Well, sir.' he said dejectedly. 'It's all up. I'm in a mess. I came here because I think you're my friend, but I don't see what you can do either.'

" 'What's up?' asked the teacher in a matter-of-fact tone of voice as if he did not think anything could be as serious as the boy made it, although he was ready for anything.

" 'It's this. Three of our gang and I have been pinched for getting motorcycles out of box cars in the

yards and selling them. The rest of the gang bailed us, but it looks like a couple of years or more. They got some other things against the gang, but that was before I belonged. Wish I never joined the bunch. I wasn't really along the night they got the motorcycles and had nothing to do with it, but I knew about it and was with them when they picked us up. I suppose I'll go with the rest.'

"'Tell me this,' said the instructor. 'Will you be honest with me and give me all the information I need if I work on this and try to help you out?'

"'Will I?' the boy replied, his face brightening.

"'Very well; now go home and don't worry, except to make up your mind to behave after this.'

"The instructor realized that the boy was less guilty than his companions and was convinced that the authorities did not appreciate this difference in his favor. He called on the district attorney and ultimately arranged for the student to be placed on probation to himself. He knew the boy as well as he knew any of his students and he felt that he could be saved if the right influence were brought to bear.

"The boy played baseball very well and had a passion for the game. The teacher arranged for him to change his employment to an important machinery-building plant where an excellent baseball team was maintained, partly for advertising purposes. The boy was made a member of the team and became absorbed in his new job and particularly in the games he played. Under the direction of the instructor, he soon forgot his former associates and reformed completely.

"You will say that this sort of thing is not teaching and not a part of a teacher's work. Perhaps you are right. But just imagine how his efforts in this boy's behalf strengthened his influence with the other students and how much easier it must have been to control them and hold their interest as a result.

"I might say that this instructor teaches industry and not merely machine-shop theory and practice. This is an industrial age; the great achievements of this generation, at least in a material sense, are industrial achievements. I can think of nothing quite so fascinating as a great, modern manufacturing plant with its vast buildings, magnificent equipment, complex organization, and coördination of operations. All this the teacher brings out for his students. He makes a boring machine appear not merely as a machine tool, but as a marvelous work of our age. He brings out all this in a way to make the boys proud of their work and their calling, so that it appears to them not so much a job as a continuous adventure, something to be followed by them with pop-eyed wonder.

"He does this largely by assigning a certain amount of reading matter which emphasizes this angle of machine-tool manufacture and use, the sort of thing usually written for the intelligent public and for general business people. And every once in awhile there are inspection trips to plants where he points out the marvelous machinery. Usually new shops are selected in which the machinery is the last word. Moreover, in all his talks on the building and operation of machines he brings out the fanciful glamorous side and not merely the dull matter of bare design and construction.

"Besides, he keeps his course always up to date. Engine lathe practice as he teaches it is not based on the methods of railway repair shops in 1910, but on the most recent developments, such as multiple tooling, geared heads and everything else of the kind. And I'm sure he knows more about tungsten-carbide cutting tools than anyone in town; in fact, he is recognized as an authority on the subject and manufacturers are forever calling him on the telephone to find out whether they can cut cast iron on boring mills with the stuff at so many feet speed and so much feed, whether it can be used for cutting steel and under what conditions, and so on.

"He achieves all this by constant study and reading. He follows both technical and trade journals; the technical journals tell him what experiments are carried on and with what success and the trade publications keep him informed regarding the application of the results of the experiments to industry. As soon as it appears that something has passed the experimental stage and has been accepted in industry, he makes it a part of his instruction. Of course, not all the machines in his school shop are of the latest design; in fact, none of them are; the burden on the taxpayer would be too heavy. But he drills the students in the fundamentals on these machines and then carefully explains in what respects the most modern practice differs: or there is a shop-inspection trip to point out the difference.

"As far as his professional technique is concerned, he keeps that in line with most recent developments by going to summer sessions at the university as often as necessary, by special short courses during the holidays and by such teacher-training work as is given at the school itself.

"He sets a good example to all vocational teachers in that he keeps in close touch with the local industries. His friends include many superintendents, foremen, production managers and others in the manufacturing business, particularly the machine-manufacturing line. He mingles with these people, hears them talk of their problems, difficulties, and achievements. As a result, the machine-manufacturing business is to him not merely the operation of machine tools and the assembly of a product, but also the planning of work for the machines, the routing of a casting through the shop at the same time as hundreds or thousands of other castings, not to mention forgings and forms. He appreciates the problems of machine loads, schedules, machine and tool maintenance, power requirements, time and motion study, rate setting, idle time, design of fixtures and appliances, and all the countless other matters which have to do more with administration than actual machine operation. All this naturally affects his teaching and gives him the immediate and pronounced advantage of ability to discuss easily and with authority anything which a student may bring up.

"He is a member of the Taylor Society, the Society of Industrial Engineers, the Heat Treaters' Association; he is an Associate of the American Society of Mechanical Engineers and belongs to the Society of Automotive Engineers and to the local association of the machine-shop superintendents and foremen. Not only that: he very often works in machine and tool plants in his summer vacations. Last summer he was employed in the production department of a Cincinnati machine-tool plant, the summer before he operated a very modern screw machine for a Buffalo automobile manufacturer. The summer before that, he attended summer school, but four years ago he worked in a Newark tool shop during vacation.

"I give him credit because, in spite of his enthusiasm he has not lost his sense of perspective. He understands the vocational movement and its relation to the general educational scheme of things and the welfare of the community. He is not one of those furious, headlong crusaders who thinks that the vocational school is the final solution for each and every educational difficulty, that every educational problem can be resolved into one of vocational and industrial training, that the vocational movement spells the end of all cultural and academic schooling, that vocational training is the best possible preparation for every conceivable kind of work including law, journalism, and the ministry. You know, there are men like that, I've met them. He knows that vocational education is intended for only a portion of the young men of the population and that it is nothing at all for the rest.

"Naturally, he has become quite well known in the community and his classes are very popular. At the end of the semester in February an extremely bright and capable young fellow joined his machine-shop class. He had completed one half of his second year at high school. The instructor soon became acquainted with the lad and found that he intended to become a mechanical engineer. He discovered that he had done excellent work in high school, that he was the son of well-to-do parents and that there was no reason in the world why he should not follow a conventional program of engineering training. His tremendous enthusiasm for things mechanical had enabled him to prevail on his parents and others to permit him to attend the vocational school with the intention of going directly from the school into industry. The boy was doing splendid work and was a credit to the class, but the instructor saw that he had made a mistake in joining it. Less than two weeks from the time the boy first came, he kept him after school one evening, took him into his office, and talked common sense to him with the result that he determined to return to high school and complete his course and later study engineering at the university. He told the boy that he could complete an apprentice course for college men in a good many reputable manufacturing plants and that he would help him with his apprenticeship, if necessary, when the time came. The boy was able to make up the little time he had lost and continued with his class without loss of time.

"The instructor had sense enough not to permit this boy to attempt to make vocational training the only basis for professional work in engineering.

"I think the teacher's common sense and level head result very much from his persistent contact with many activities other than his own. For instance, I've seen him at symphony concerts, dramatic associations, art galleries, a ball game, high-class legitimate plays, institute lectures, and at services in church.

"I like to talk about this man, but I'll have to stop some time; but not before I've told you about a striking characteristic in which he differs from many, if not from most educators. He is very careful about his clothing and appearance and is groomed like a bank president. He is not a fop but he knows that boys pay much attention to appearances, more than they ought to, perhaps, because they have not yet learned to estimate true personal value and worth. Accordingly, he makes it a point never to appear at a disadvantage with anyone they might know or meet. His suits are of good style and fit and are always pressed, his shoes are invariably polished, his collars immaculate and his ties fresh and neatly adjusted. He is always shaved and he frequents a barber shop at suitable intervals.

"And when he goes home from work even his finger nails are clean. Most machine-shop men claim that it can't be done, but he succeeds somehow. I don't know what his secret is. I remember that when I was out in the foundry and had dates in the evening I used to clean my hands with oakite. It was hard on the hands, but it did the work. He must have something better. At any rate, when he leaves the school he looks like an advertising representative or security salesman and his students are proud of him and boast that 'he is the only teacher in the place who looks like anything.' "

The foundryman paused to light a cigaret and then looked at his watch. His eyes opened wide in surprise.

"Three-ten and a standards-committee meeting at three o'clock," he announced. He seized his hat and calling "good-by," fled from the room.

The three other men sat in silence for a moment.

"I've got an idea," began the secretary of the local foundrymen's association. "I'm going to try to get him to give that same talk to our state conference of vocational educators next month."

LABOR'S REWARD

Bread earned by the sweat of the brow is thrice blessed bread, and it is far sweeter than the tasteless loaf of idleness. — *Crowquill.*

TEACHING

Take a big view of your job. The object of teaching is twofold: (1) to impart knowledge, and (2) to influence character. In the main, it doesn't make so much difference what is taught, as it does how it is taught. Teach the job for the boy's sake. — *Lewis Gustafson.*

Sheets from a Stage Carpenter's Notebook

*Page Kirk**

THE steady growth of school theatricals has added to the list of the industrial-arts teacher's duties, another one, that of scene building, stage carpentering, manufacturing of stage properties and stage furniture. To him comes the demand for temporary, often movable, always adequate and safe construction of any setting from life or imagination, to be produced with pupil labor, immediately and at lowest cost. Perhaps it is for stage furnishings historically correct, designs supplied by the shop; or for materialization of ideas conceived in terms of complication and labor, presented by the earnest teacher ignorant alike of shop language and shop methods.

In many cases these latest additions to his duties have not been received with open arms. That school dramatics have come to stay is unquestionable. It remains for us of the stage crew to turn a liability into an asset. To a progressive teacher, nothing which so arouses pupil interest can be a liability. Traced to causes, the shop's lack of enthusiasm is generally due to inaccessibility of information presented in a usable form, and to a crowded curriculum not yet adjusted to include stagework. Therefore it is an added call on free periods or after-school time. Only a busy shopman knows how full both are! The curriculum is largely a problem of supervisor and administrators; the question of available material we must answer for ourselves.

In stagework there are three general divisions — lighting, scenery, and properties. The last is broadened to include furniture. Although there are good books on lighting and scenery as well as on production, nothing has been published which adequately handles making of stage furniture. Perhaps this is because it is an outcast acknowledged by neither producer nor shop. The professional buys from furniture stores, even at times from antique shops. The amateur borrows or rents. With both there is a growing realization that stage furniture should be governed by the laws of the sham world of the theater, not by the laws of reality. And therein lies its attraction. The facile mind of youth finds the problem irresistible. To make something of nothing or to make a thing appear other than itself, calls for ingenuity. Also the results are concrete in the school world of abstractions, they are to meet a real, immediate need, not one imagined or created by the teacher. Everything considered, it is too good a bet to be overlooked by the shop. Obstacles are to be removed, not accepted as insurmountable.

After all, there is no new principle involved. It is only a case of working for large effects rather than for finish of detail, of discovering and using the magic wrought by lights and distance. Fundamentals are unchanged, the rules of construction are the general ones taught in any woodshop. Many a boy have I seen shamefacedly repair a collapsed chair or table in the construction of which he had willfully disregarded some oft-repeated direction of his busy teacher. Thereafter he listened with more appreciation.

The stage is a shop laboratory, also an excellent opportunity for teaching the good old American virtue of successfully meeting an emergency.

Fortunate in accessibility to information furnished by the museums and libraries of Washington, it was possible for the writer to assemble, verify, digest, and adapt a wealth of material. To the results thus obtained, is added the experience of many years. My object in writing this is fourfold:

1. To save time by supplying authentic copies of historical pieces and by putting them into shop form.
2. To explain the fundamentals of stage carpentry as differing from cabinetmaking, thereby eliminating unnecessary work and expense.
3. To suggest the range and type of stage pictures easily obtainable with a limited equipment.
4. To emphasize the necessity for truth and beauty; truth as to period and place, combined with beauty of proportion, line and color.

Construction

Necessarily much of the stage-carpentry work is assigned to special students whose available time is regulated by the school program. Usually their free periods do not coincide with those of a teacher. The demands of a class permit only limited individual supervision. If at times these directions seem unnecessarily detailed, it is because they are intended for an inexperienced pupil, not for an expert. They are expected to replace verbal teaching wherever printed instructions can be made sufficiently explicit.

Many of the pieces can be made directly from the illustrations. When drawings are necessary, make them full size, paste on wood or wall board and saw. Blue prints of duplicate parts will save tracing. The original should be made on tracing paper. Use the cheapest construction which will give the effect desired. Build the frame securely, to stand abuse. Use bracing instead of joints unless a joint is equally easy at that place. With good lines and good proportions, details of materials and workmanship may be slighted, so long as the durability is not affected. Paint and stage lighting hide a multitude of sins of omission, since the audience sees from a distance. The wood may be seconds or scraps, or even knocked-down boxes. Most of the parts are best made of the cheaper wall board, which may be bent around curves easily. For seats and tops the wall board should be a better grade, the kind made of strips of wood backed and faced with paper. Even this requires extra bracing where there is to be much strain, as on the seat of a chair. When the frame is finished, cover it with wall board as shown in the drawings. Overlapping is important, as fronts show more than tops since only balcony seats look

*Washington, D. C.

down upon the stage, and they are too far back to require consideration.

Decorations

Put on the background color and allow it to dry thoroughly. Then put on the decorations. Ornamental designs and decorative lines should be on a large scale. A good rule is to make nothing under ½ in.; less than that does not carry across the footlights. Decorations should be true copies, if the pieces are supposed to be historically correct. Under all conditions copies are safer unless you have an exceptionally gifted pupil who can design well. Stagework does not offer a good place for originality in self-expression. Most "original designs" are very poor. Any good book on historic ornament, such as Meyer's *Handbook of Ornament*, will show examples of real pieces. A file of the *National Geographic Magazine* is invaluable, authentically covering the countries of the world as it does. A few typical patterns are given on the accompanying plates, together with their names, and the way in which they were used originally, and the construction on which each is based. Carving and weaving are easily simulated by painting shadows. Consider the light as coming from one side and above, always from the same direction. Geometric motives were much used by the Ancients, especially the Greeks, who preferred simplicity with perfection of line and proportion, rather than the splendid magnificence characteristic of the elaborate ornamentation of Rome.

Paint

Permanent pieces may be done with oil paint if desired. Water color, however, is equally good and is better for temporary pieces. Besides wearing well, oil does not stain costumes; but it is expensive, slow to dry, and prohibited by some fire inspectors. Water color is economical, fireproof, dries rapidly, is without gloss, and is easily altered, renewed, or removed by washing. Buy prepared calcimine or mix together glue, water, and dry paint. The calcimines combine ease of preparation with insured uniformity of color; but their range is limited to light and medium tones — also they are more expensive. The formula for home-mixed water color is ½ lb. sizing glue (tan-colored granular is better than white flaked), dissolved in 1 gallon of hot water; add as much dry paint as is required to give an even coat of the desired color. Water paints dry lighter, oils darker. If water paints rub when thoroughly dried, add more glue dissolved in a small quantity of hot water. If the glue jellies, place the can in hot water or on a stove, stirring constantly. Never place oil paint on a stove. Paint should be thick enough to cover with one coat. Roughly estimated, 1 gallon covers 300 square feet of surface, but this varies according to the texture of the surface. The foregoing formula is also used for scenery; when so used, it should be thinner. Of course, if a gloss is desired, as for the Chinese lacquer, only oil enamel should be used. If at the time of the performance the odor is entirely gone, there is little danger of the fire marshal condemning oil-painted furniture. Under no condition should canvas scenery be painted with oil, for the fire risk is too great. Speaking of odor, it is well to mix the glue-water-paint combination as needed. A few days of standing makes it odoriferous.

Color Scheme

Any color may be mixed, but some are poor under artificial lighting. Blue and violet-blue are apt to dull down to a gray-blue. Blue-violet and violet turn into a warm gray, red violet keeps its color. Green-blue, green and blue-green are intensified, especially under green moonlight. Generally a pigment loses its brilliancy or changes entirely if it is under light of its own color. Under red light a red object usually appears black. In beauty and intensity, flame and orange rival the greens, both under general lighting and in moonlight. Yellow and lemon yellow become white; a bright orange gold gives true yellow. White takes the color of the light, black stays black and cool browns are generally more agreeable than the warm browns. Always remember that if you wish a color to stand out, hue and value must contrast with the background; if you want it to disappear, it must match the background. These are general rules, none of them are infallible. Every woman knows she can match a dress in daylight and have a mismatch at night, or vice versa. The same holds true of pigment. The only certain way is to try a dried sample under the lighting in which it is to be used.

Versatility

Permanent equipment should be adaptable. If color and details are changed, well-built, conservative units can be used repeatedly. Ingenuity is better than hard work. The Chinese chest is an example. In a pirate's den it is dark oak bound with heavy iron straps, heavily hinged and locked. Straps and hinges are made of wall board painted a dull black. Minus some of the strapping but with the same hinges and a large ornamental key escutcheon, it is Old English or Early American. With a background of brown or black or even of bright blue, decorated with a running pattern of gay conventionalized flowers, it becomes the dower chest of New York, Dutch Pennsylvania, Holland, Germany, or Scandinavia. The flower patterns vary according to the country. They should be accurate copies reproducing authentic designs. Made of stone, with a low relief carving of an Aztec feathered serpent, it is from a Central American temple. The straight bench may also have carving on either end. Carving is simulated by gluing to the surface a wall board replica cut on the band saw.

A throne for any period can be made with a box, a platform, and a flight of stairs — stock equipment of all stages. The platform may be a low one mounted on trestles or on 2 by 4's. It must be firm. Lacking a platform, I once used the school lunchroom tables. The height of the platform depends upon the importance of the potentate — the greater the ruler the taller his throne. Not less than three steps or more than eight is a working rule. Face the platform and steps with wall board, then paint it. Solid gold is universally good, although a set may be given more character by the addition of some typical design around the base. The seat is made of a box similarly decorated or left rough and covered with drapery. The wall board looks well against either flats or curtains. The draped seat is unsatisfactory against a cyclorama. The length of the royal leg determines the height of the seat. It should be tall enough to require a footstool, rather than undersize. If the seat is shop made, a 24-in. cube fits the average grown boy. Shared with a consort, the length of the seat is doubled. Here should end the responsibility of the stage carpenter. The construction crew finished one such throne thus: Steps, platform, and seat were gold. On the seat was a red cushion, from the four corners of which fell long red tassels, almost touching the floor. The footstool was a cushion of the same material. From it a strip of red throne carpet led down the middle of the gold stairs and continued across the stage. Back of the seat hung a gorgeous tapestry, a gold circle with widening rays of silver, gold, green, and old rose bordered by an intricate design in gold and silver. The audience never surmised that it was made of an old tablecloth painted with water paints and radiator gild. To them it was the finishing touch to a really beautiful set. It was entirely pupil made, and cost only the price of the paint. For a modern setting, the back was gilded wall board colored with rays of variegated light which came through a narrow slit between the platform and the wall board. The hanging behind a Chinese emperor might be of imperial yellow. Sprawled across it a black dragon might paw the air with five-toed claws. The throne carvings were put on with lacquer. An Aztec chest's carvings were made of appliqued wall board.

Dimensions

The illustrations which accompany this article cover a wide field, therefore no one period is thoroughly treated. They

are intended as a foundation on which teacher and pupils build their own conceptions. Sizes, curves, and slants are carefully estimated with regard to stage conditions and the modifications necessitated thereby. They are for any setting, although directly planned for one of average dimensions, about 17 by 27 ft. A slight change of scale may be desirable for a small platform or for children. If change seems unavoidable, keep the same proportions. Since the characters are always the same approximate height, assuming them to be adults, be the set large or small, the scale of the furniture as given is a guide for new designs. The variation demanded by an extended or contracted set is best accomplished by increasing or reducing the number of units rather than by exaggerating the size of those used. Replace single pieces on a small stage by groups on a large one. Exaggeration is effective only when well done by the experienced producer rather than by the amateur. With most, the difficulty is to avoid the unintentional exaggeration caused by the distortion of elevation and artificial lighting. In these plates, the effort has been to change ordinary dimensions so as to overcome this distortion. The proper place for size adjustment is in the scenery.

Originality

Do not let the boys miss the fun of creation. Use these drawings when you can, if followed exactly they will insure satisfactory results, but do not stop there. By applying the general rules you can work out the other necessary pieces for yourself. The plates were planned as timesavers. Often they will be all you require for a scene. I hope they will save enough labor to transform stage carpentry from a necessity to a pleasure.

Period Settings

Every stage carpenter is at times confronted with the necessity for becoming an antiquarian. In 1929–30, the epidemic of historical settings was especially acute, aggravated by the celebration of Vergil's birthday, some 2,000 years overdue. The classical-language departments, prodded by dwindling classes to the uncongenial task of "Jazzing" Latin and Greek, joyfully fell upon this promise of legitimate limelight. Throughout the land was heard their cry for authentic settings for productions ranging from tableau to pageant. Dramatic associations, ancient-history classes, costume-study clubs and interior-decoration groups coöperated. Their aim was to be educational, to portray truly Roman and Greek life. Original furniture is to be found only in museums or in other collections, and good copies are rare. The shops worked from pictures or text references. The drawings of Plate 1 were assembled because of the demand at that time. The Washington bicentenary, to be nationally observed throughout 1932, will call for Early American furniture, hence Plate 3. Here again originals will be too valuable to borrow. They may be produced in the school shop, however, and will appear well on the stage.

Greek and Roman

Once made, the Greek and Roman pieces proved to be some of our most useful equipment. They have been used in plays by Shakespeare, Shaw, Dunsany, and others.

As to the proper use of the different pieces, the couch is interchangeably a bed or a banquet couch, typically Greek but allowable in a Roman room. The table is a copy of an original, of about the time of the Athenian supremacy. It was of metal. It also could be used in a Roman set. When choosing designs for furniture, know the place and date of the play. Greek furniture might be in a Roman house, also Roman in late Greek, but Roman in early Greek would be an anachronism. The chair is Greek, suitable for a richly fitted interior. The stone throne belongs on a dais when used in an interior. In an exterior, it should be on the outer rim of the orchestra circle of the theater and is the seat of a priest or of a dignitary. Also it could be used in an open court or colonnade. The stool is more informal, for the use of lesser characters. This last is a labor-saving suggestion for the stage carpenter. It is a modern camp stool allowable only because the X construction was much used by all ancient races. Dimensions are exaggerated because magnitude befits the heroic age. Gild the wood or paint it bright blue, and decorate the canvas to represent cloth or skin, the colors being black and gold; or gold, red, and blue with a gilded frame; and black and gold with a blue frame.

Do not hesitate to use bright hues. Both Greeks and Romans painted the exteriors of their houses and statues. White plaster reproductions are not typical. Furniture was often metal combined with dyed textiles or painted skins. When made of stone or wood, they were frequently painted. If you wish a neutral setting, with color accents kept for costumes, the furniture can be either a blue-gray or brown-gray stone with the designs in darker tones of the backgrounds; or it may be all black or some tone of the back drop. In "Helena's Husband," a burlesque, I deliberately used the popular misconception which is largely due to Wedgewood pottery. Characters, furniture, properties, and trees were entirely white silhouetted against a Wedgewood blue curtain. Although these variations are permissible, it is historically true to have positive colors, such as red, blue, yellow, green and gold combined with accents of black, or opaque white. The red often goes toward brick dust, Pompeian, Venetian, or Indian red, even burnt sienna. Textiles and small pieces were sometimes brilliant, almost vermilion. The "Royal purple" was blood-red, "royal" because of its rarity. The blue was clear and bright — cobalt is good. Yellow paints were mostly earths such as yellow ocher — there was also a golden yellow. They probably used other colors but we are certain of those just mentioned. Palace and temple furniture was often overlaid with real gold; some was inset with ivory and semiprecious stones. In materials and color it was not unlike the Temple as described in the Old Testament. The Jews brought their artisans from the coast, "workers in linen and fine gold," with tools, materials, and training similar to those found in other coastal settlements.

Greek Couch

Bill of Material

Wall board: One strip, 22 in. wide, 10 ft. long, to be used to cover top of couch. Two strips, 22 in. wide, 8 ft. long, to face sides. Wall board is generally 4 by 8 ft., but also can be bought in 10- and 12-ft. lengths.

Wood: Two boards, 1 by 10 in. by 10 ft., cut into two 7½-ft. lengths and two 2-ft. lengths. One board, 1 by 6 in. by 8 ft., cut into four 2-ft. lengths. Three boards, ½ by 2 in. by 12 ft., cut into eighteen 22-in. lengths.

2 pc.	1 by 10 in. by 7½ ft.	Sides
2 pc.	1 by 10 in. by 2 ft.	Sides
4 pc.	1 by 6 in. by 2 ft.	Legs
18 pc.	½ by 2 by 22 in.	Top

Construction. Makes full-sized drawings of the side and legs shown in Figure 1. Run a second line 3/16 in. outside of the drawing of the side. Preferably drawings are made on tracing paper and blue-printed for duplicate patterns. Four of the side and two of each leg will be required. Paste the pattern on wood or wall board according to specifications, and saw on the line. For sides, saw the wood on the inner line, and the wall board on the outer line. This is done so that the extra 3/16 in. allows for overlap of the wall board at the top. To cut spiral end of side, add a 2-ft. board to the 7½-ft. board. Nail legs to sides. Fasten the two sides together securely with the 2-in. strips. Carry stripping around curved ends as shown in illustration. Scraps of any uniform thickness may be substituted for ½-in. stripping, but they must be narrow to turn curves. Cover top with wall board, then sides, turning blue print within, and overlapping the top with the sides. If the set shows only one side of the couch, leave the hidden side unfinished. Paint with ground color, dry thoroughly, and decorate.

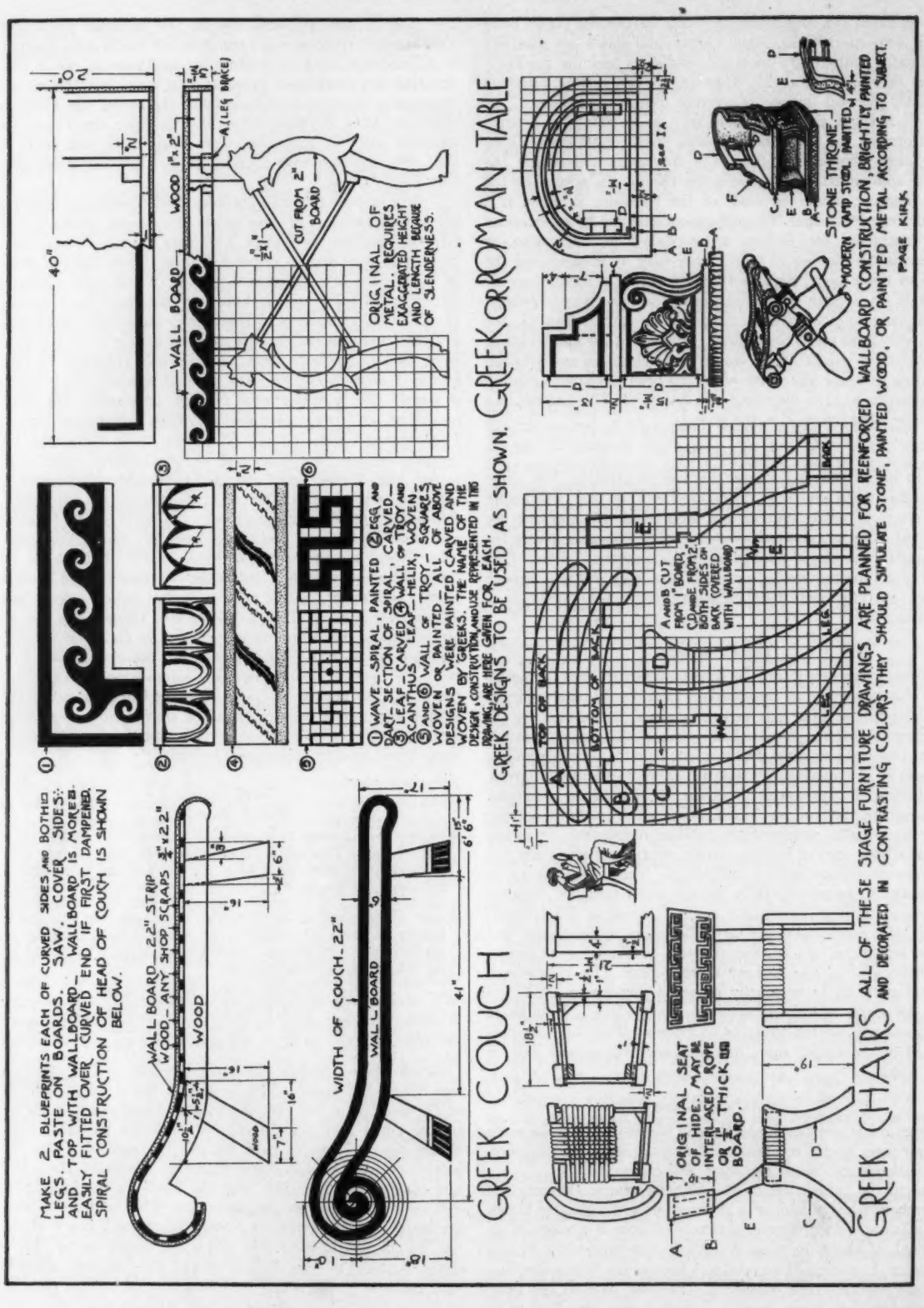

GREEK OR ROMAN TABLE
GREEK DESIGNS TO BE USED AS SHOWN.
GREEK COUCH
GREEK CHAIRS
ALL OF THESE STAGE FURNITURE DRAWINGS ARE PLANNED FOR REENFORCED WALLBOARD CONSTRUCTION, BRIGHTLY PAINTED AND DECORATED IN CONTRASTING COLORS. THEY SHOULD SIMULATE STONE, PAINTED WOOD, OR PAINTED METAL ACCORDING TO SUBJECT.
PAGE KIRK
STONE THRONE.
MODERN CAMP STOOL PAINTED
ORIGINAL OF METAL. REQUIRES EXAGGERATED HEIGHT AND LENGTH BECAUSE OF SLENDERNESS.
WALL BOARD
WOOD 1" x 2"
CUT FROM 2" BOARD
40"
20"
MAKE 2 BLUEPRINTS EACH OF CURVED SIDES AND BOTH LEGS. PASTE ON BOARDS. SAW. COVER SIDES AND TOP WITH WALLBOARD. WALLBOARD IS MORE EASILY FITTED OVER CURVED END IF FIRST DAMPENED. SPIRAL CONSTRUCTION OF HEAD OF COUCH IS SHOWN BELOW.
WALL BOARD—2.2" STRIP
WOOD—ANY SHOP SCRAPS
WOOD
WIDTH OF COUCH-22"
WALL BOARD
ORIGINAL SEAT OF HIDE. MAY BE INTERLACED ROPE OR ½" THICK BOARD.
TOP OF BACK
BOTTOM OF BACK
LEG
BACK
A AND B CUT FROM 1" BOARD. COVER FRONT & BOTH SIDES OF BACK (COVERED WITH WALLBOARD)
1 WAVE—SPIRAL, PAINTED
2 EGG AND DART—SECTION OF SPIRAL, CARVED—
3 LEAF—CARVED
4 WALL OF TROY AND CANTHUS LEAF—HELIX, WOVEN—
5 AND 6 WALL OF TROY—SQUARES, WOVEN OR PAINTED—ALL OF ABOVE DESIGNS WERE PAINTED, CARVED AND WOVEN BY GREEKS. THE NAME OF THE DESIGN, CONSTRUCTION AND USE REPRESENTED IN THIS DRAWING, ARE HERE GIVEN FOR EACH.

FIG. 1

Greek or Roman Table

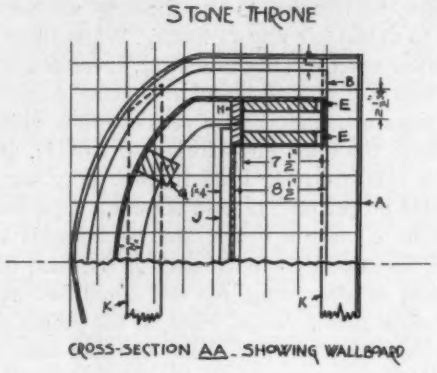
Bill of Material

Wall board: One strip, 40 by 20 in., for top of table. Two strips, 40 by 3½ in., for sides of top. Allow extra for overlap at end. Two strips, 20 by 3½ in., for ends of top.

Wood: One board 2 by 8 in. by 10 ft., cut into four 30-in. lengths. One board, 1 by 2 in. by 14 ft., cut into two 38-in., two 20-in., and two 18-in. lengths. One board, 1 by 1½ by 2 ft., cut into four 6-in. lengths. One board ½ by 1 in. by 10 ft., cut into four 30-in. lengths.

4 pc. 2 by 8 by 30 in.	Legs
4 pc. ½ by 1 by 30 in.	Braces for Legs
2 pc. 1 by 2 by 38 in.	Sides of Top
2 pc. 1 by 2 by 20 in.	Ends of Top
2 pc. 1 by 2 by 18 in.	Braces at Top
4 pc. 1 by 1½ by 6 in.	Leg Braces at Edge of Top

Construction. Make full-sized drawings of the leg, blueprint four copies, paste on the wood, and saw on the line. Construct the frame for the top as shown in Figure 1. Securely fasten the legs to the top, slipping blocks between the legs and the wall board as at A. Adjust until all four feet are on the floor. Attach X braces. Then, in the order named, cover the top, ends, and sides with wall board. Note direction of overlaps. Paint with ground color, dry thoroughly, and decorate.



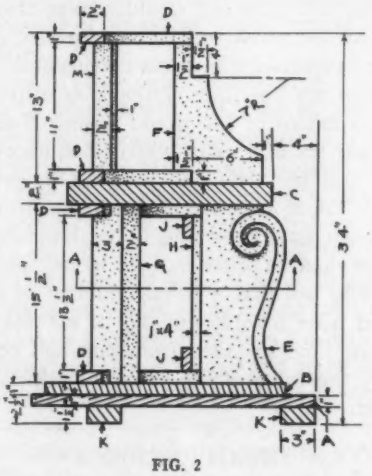


FIG. 2

Greek Chair
Bill of Material

Wall board: One strip, 11 in. wide by 5 ft. long, to be used for the back. One piece, 22 by 18 in. to be used for the seat (The latter is not required if seat is made of wood or rope).

Wood: One board, 2 by 10 in. by 4 ft. 6 in., cut into two 27-in. lengths. One board, 2 by 8 in. by 8 ft. 6 in., cut into two 27-in. and two 24-in. lengths. One board, 1 by 6 in. by 4 ft., cut into two 24-in. lengths. One board, 1 by 4 in. by 8 ft., cut into two 17-in., two 11-in., one 20-in., and one 16-in. length. Two triangular blocks, about 3 by 3 by 3 in.

2 pc. 2 by 10 by 27 in.	Back Verticals, E
2 pc. 2 by 8 by 27 in.	Back Legs, C
2 pc. 2 by 8 by 24 in.	Front Legs, D
2 pc. 1 by 6 by 24 in.	Back, curved top A and bottom B
1 pc. 1 by 4 by 20 in.	Front of Seat
2 pc. 1 by 4 by 17 in.	Sides of Seat
1 pc. 1 by 4 by 16 in.	Back of Seat
2 pc. 1 by 4 by 11 in.	Sides, outer facing
2 pc. 3 by 3 by 3 in.	Leg Blocks

Construction. Make a full-sized drawing of the Greek chair parts shown in Figure I. Blue-print two each of the back verticals, back legs, and front legs; paste the blue prints and drawings of the back on wood and saw out along drawing lines. Construct the frame of the seat. Glue and screw the legs to the frame, using four screws to each leg, since their curve makes them weak at the joint. Heads of screws should be countersunk on the inner side of the chair, and the corners of the seat should be reënforced with blocks. Construct the back. Cover the back with light-weight wall board. When finished, the back, from A to B, should measure 10 in. The extra 1 in. of wall board is allowed because of shaping necessitated by the sloping side edges. Covering the back is the most difficult part of the job. The appearance of the chair depends upon how neatly this part of the work is done. When curving wall board, it is a good plan to dampen it first. To do this, place damp layers of cloth or newspaper on either side of the wall board and leave it for several hours, or until the wall board is pliable. During the dampening process, place between weights if possible. Care must be taken not to have the cloth or newspaper too wet.

Cover the seat. If the chair is to be a permanent part of the equipment, the seat may be made of ¾- or ½-in. rope. Varnishing or painting prevents stretching. Ordinarily a wood or heavy wall-board seat is sufficient. Paint the frame with body color, dry thoroughly, and decorate.

Stone Throne or Seat
Bill of Material

Wall board: Two strips, 13 in. by 5 ft., for inside and outside of back. One strip, 15½ in. by 6 ft., for outside of base. One strip, 15½ in. by 2 ft., for front of base. Two strips, 4 in. by 2 ft., for facing to legs at E. One strip, 2½ by 38 in., for front of base A. One strip, 2½ by 7 ft., for sides and back of base A.

Wood: One board, 2 by 10 in. by 8 ft., cut into two 33-in. and two 12-in. lengths. One board, 1 by 10 in. by 5 ft., cut into two 30-in. lengths. Two boards, 1 by 12 in. by 12 ft., cut into four 30-in., two 35-in., and two 38-in. lengths. One board, 1 by 2 in. by 6 ft., cut into two 11-in. and two 24-in. lengths. One board, 2 by 3 in. by 3 ft., cut into two 15½-in. lengths. One board, 2 by 3 in. by 3 ft., cut into four 15½-in. and one 38-in. length. One board, 1 by 1½ in. by 6 ft., cut into one 38-in. and one 33-in. length.

2 pc. 2 by 10 by 33 in.	Seat, C
2 pc. 2 by 10 by 12 in.	Arms, F
4 pc. 1 by 12 by 30 in.	Curved Pieces, D
2 pc. 1 by 2 by 11 in.	Back Uprights, M
2 pc. 2 by 3 by 15½ in.	Back Uprights, G
4 pc. 1 by 8 by 15½ in.	Leg Uprights, E
2 pc. 1 by 4 by 13½ in.	Back of Legs, H
2 pc. 1 by 2 by 24 in.	Leg Braces, J
2 pc. 1 by 12 by 35 in.	Base, B
2 pc. 1 by 12 by 38 in.	Base, A
1 pc. 1 by 8 by 38 in.	Base, A
1 pc. 1½ by 3 by 38 in.	Base Support, front K
1 pc. 1½ by 3 by 33 in.	Base Support, back K

Construction. (See Figs. 1 and 2.) Make full-sized drawings of all curved parts. Draw outline of base A. Inside of A, 2½ in. from front and 1 in. from back and sides, draw a parallel line for B. Draw C inside B, 1½ in. from front, 1 in. from back and sides. Inside of C draw D, 7 in. from front and 1 in. from back and sides. Make four blue prints of leg curve E, two of arm curve F, on each of A, B, and C, and four of curve D. Paste the blue prints on wood and saw on the line. Construct the back and arms as one unit, the base as another, and assemble the throne. Cover entirely with wall board as shown. Paint with body color, dry thoroughly, and decorate to represent carving.

(*To be continued*)

There is need of a wider vision. There is too much of a tendency to shop for shop's sake, and not enough for the boy's sake. The great purpose of industrial arts is to teach certain important and significant elements in civilization. — *Lewis Gustafson.*

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

A PROBLEM OF ADULT EDUCATION

Prison and reformatory statistics show that today the average age of the prisoners lies between 20 and 25, that many of the penal institutions are overcrowded, and that because of this overcrowding there is not enough work to keep the prisoners fully occupied.

An old adage says "An idle man's brain is the devil's workshop." The modern idea in incarcerating the wrongdoer is reformative as well as punitive. If this is true, failure to keep the prisoner fully occupied through his waking hours is not fulfilling the objective which modern officials of penal institutions are advocating.

While modern prison life is no longer the dreadful ordeal that it was, say, 100 years ago, nevertheless, depriving a man of his freedom is a serious matter. It is true, many of those placed in prison are there surrounded with better living conditions than they are accustomed to while they have their freedom. Nevertheless, they yearn for the freedom of which they have been deprived.

Unoccupied time hangs heavy on the hands of men who are able to do as they please, but it hangs doubly heavy on the hands of the man from whom has been taken the privilege of saying what he is to do with his time. In the modern prison, humanely conducted, and not overcrowded, a well-regulated and supervised plan of activities may be developed which has a beneficial influence on the man who is to later return to everyday life. When the prison, however, is overcrowded, when the usual activities which have been devised for a stated number, must be split up and divided among a much larger group, it is self-evident that there will be a great amount of time which in some cases at least is largely spent in doing nothing. It is under conditions such as this that prison officials expect trouble. The usefully occupied man, when well fed, and when housed under sanitary conditions, has no time to breed dissentious thoughts; but give a dissatisfied person time to brood over his troubles, then things are sure to occur.

Considering conditions as they are, there seems to be a very good avenue for escaping evil consequences. First of all, a large number of the prisoners are young men, men who are still susceptible to educational influences. Why not give them an opportunity to better their condition when they again enter the human family as members in good standing? Statistics show that most of these men have not had a great deal of education. Why not give them an opportunity in the periods of enforced idlenesss to make up for this deficiency? Of course, there are some provisions made for this already in many institutions, but most of the educational work provided is of the academic type.

Not every one of the prisoners, however, is willing and able to sit down quietly and study. However, it is quite certain that a large majority of these men could be interested in work of the type that is offered in industrial-arts and vocational classes in the technical high school or the trade school. Of course, the objection might be raised that if prisoners were allowed to use tools, such as hammers, chisels, etc., they would, no doubt, be tempted to use them as weapons with which to fight their way to liberty. While there seems to be some weight to this argument, nevertheless, these same men are now engaged in making furniture or doing other machine work of various kinds which present about the same possibilities for trouble, and yet there is comparatively little trouble. Why not, then, invite the proper official from the state department of education to make a survey and recommendations to relieve the situation? With part of the men busy in classroom or class shop, the rest could be employed at the usual prison duties. Then, at the proper time, a shift could be made, and those who had been in the classroom would take the place of the workers in the prison shop, while the rest would take up their studies. In this way the results of the overcrowded conditions would be beneficial rather than detrimental.

Men who are not fully equipped to cope with the complex problems of life would have a chance to reënter human society better prepared to make good because of training they had received in prison. The bully and the trouble-maker would be kept so busy that he would have little time to hatch out his troublesome plans, and no prisoner, after having served a sentence, would feel that a certain number of months or years had been forcibly cut out of his life, but that instead the time so taken from him had been amply repaid by the value of the education which had been given him.

OBSOLESCENCE

According to a survey made some time ago, 50 per cent of the machinery used by industry is obsolete. Some farsighted industrialists are therefore providing employment for at least some of their workers, during these dreary months of fighting back to normal times, by carefully going over their plants and replacing machinery that is no longer up-to-date. They are preparing for the time when American industry will again assume its normal stride. Throwing out this obsolete machinery and replacing it will put these plants in a position to produce at the lowest possible cost, making it possible for still more Americans to enjoy the products that they have helped to produce, and to make human life something more than a mere striving after the wherewithal to continue life.

In the meantime, this fight against obsolescence

gives employment to many men. Not only does the machine industry have to furnish the required machines, but the men in the individual plants have much to do relocating machinery that is still to be used, locating and putting in suitable foundations for the new machines, etc. Of course, this will not at once return the prosperity for which all are so anxiously praying. It does, however, give employment to many who would otherwise have to be fed from public tax money with the danger that they might permanently lose that ambition and self-respect which is the birthright of every citizen of our country.

While this eradication of obsolescence in industry is going on, at least to some extent, is it not time to apply the idea in the school field as well? Is there not a great deal of obsolescence observable in educational matters the country over?

Our president, governors, legislators, and all public-spirited men urge local and state authorities to do everything in their power to inaugurate public improvements so as to give work to the vast numbers who are at present unemployed. In some cases this has been done, and obsolete and new public buildings, roads, and parks have been benefited by the movement, while many workmen have in this way been given an opportunity to earn the money required to properly house, clothe, and feed themselves and their families, instead of obtaining it from public or private relief agencies.

While some of these public buildings so erected have been schools, nevertheless, the idea of obsolescence has not yet been applied in the school shop as it has in the industrial shop. How many teachers could tell of courses that are inadequate owing to the lack of proper equipment? How many school shops are over-equipped in one direction and under or not equipped in others? One need but look at some of the earlier woodworking shops equipped with long rows of lathes that are no longer used, while there is a dearth of other machine equipment that is needed and up to date. This is one example that could be remedied now, to speed up the return to normal conditions.

What has been said of the woodworking shop applies equally to the other school shops. It may be defensible to give some industrial-arts work in the grades with a meager, narrow stock of hand tools, but even here the tools should be of good quality and in first-class condition. In the higher grades of high-school work, however, where some specialization is striven for, the boy should unquestionably come in contact with honest-to-goodness shop machinery. This does not mean that the heaviest and most complicated types of production machinery are ever to be placed into the school shop, but the student should have an opportunity to learn tool operation on machines actually used in industry and do work under conditions and in a manner acceptable in the commercial shop. Looking at it from this viewpoint, there is a great amount of obsolescence in many of our school shops.

Then there are still too many shops that were originally stuck into the basement because it became fashionable to include manual training in the curriculum. The work has long outgrown the smelly, ill-lighted quarters, but nothing further has been done about it.

This, too, is an example of obsolescence that should be studied and if possible remedied. Tax money now spent in doles could be paid out to mechanics to put up school shops worthy of the name, well lighted, properly ventilated.

Finally, there are still too many school principals and superintendents who look upon the industrial-arts work as a welcome aid in augmenting their pay check, but as for a real understanding of its aims and purposes—they have none. These men, in times such as the present, when retrenchment is preached, although usually practiced only ineffectually on items that even in the aggregate do not represent a real saving, are prone to quickly decide to lop off those items in the curriculum about which they know least. This accounts for the closing of school shops and the summary dismissal of shop teachers. This is another item of obsolescence that could be looked to. Future school executives must be trained so as to have a background broad enough to see more than just the academic side of their problem. They must be brought in line with modern educational thought, and keep abreast of modern advances or expect to be replaced, just as obsolete buildings, obsolete machinery, obsolete equipment, and obsolete methods must be replaced to further efficient and economic progress.

Obsolescence—yes, there is much in the school shop that might be taken care of in these times, and a little study of this question will benefit the school just as it will industry.

ABRAHAM LINCOLN

This year, due to the extra pressure exerted by civic organizations to make the Washington Bicentennial befittingly grand, there is some danger that Abraham Lincoln, whose birth also occurred in the month of February, may somewhat be forgotten.

Under no conditions ought this to be allowed in the school shop. There are few examples that could be held up for the emulation of the school boy who can equal Abraham Lincoln. Although a simple man, with very humble beginnings, he nevertheless, through hard work and self-education, prepared himself to the point where he could maintain the rôle of leadership even when surrounded by men of great learning. Despite his successes, he never forgot his humble origin, and the habits of honest toil which he established while he worked as farmer, woodsman, clerk, and surveyor remained with him throughout his life. Abraham Lincoln's industry, ambition, fairness, and tolerance are so outstanding that no shop teacher should fail to make use of the strong example which the life of this martyred president affords in the shaping of the characters of those who attend shop classes.

Junior Mechanics

*P. L. Cressman**

JUNIOR MECHANICS, in some respects, is similar to the work of the Boy Scouts of America, the 4-H Clubs, and the Future Farmers of America. It is devoted to the field of industrial arts.

These clubs were first organized in 1930. Only three clubs were organized that year to carry on experiments. Today there are at least 100 clubs organized in various sections of the country. Interest in this program has been expressed by teachers in nineteen states.

Purpose of Junior-Mechanics Clubwork

The purpose of junior-mechanics clubwork is to motivate all types of industrial-arts work in the junior high schools by the granting of awards for the satisfactory completion of units of this type of work. The program fits into the present shop programs by setting up definite standards for the completion of each unit of work in such subjects as woodworking, mechanical drawing, printing, etc. Several units may be earned outside of school shops, such as photography, gardening, automobiling, etc.

The Awards

A boy in the seventh or higher grade may make application for admission into this club. If accepted, he becomes a member and receives a membership pin. When he finishes one unit of work, as printing, art metal, etc., he becomes eligible for the *master junior mechanic degree* and pin. When he completes five units of work he is awarded the *expert degree* and pin. At the completion of ten units of work and the satisfactory performance of several additional requirements, the *wizard degree* and pin is awarded. The wizard degree pin contains a profile of Thomas A. Edison.

The Units for Which Standards are Set Up

1. Art Metal
2. Automobiling
3. Camp Cooking
4. Concrete Construction
5. Electricity
6. Foundry
7. Gardening
8. Machine Shop
9. Mechanical Drawing
10. Photography
11. Plumbing and Heating
12. Printing
13. Radio
14. Sheet Metal
15. Wood Finishing
16. Wood Turning
17. Woodworking
18. Others to be added

What Junior Mechanics Aims to do:

1. It sets up complete standards for the shopwork in our junior high schools and the home shop.
2. It provides a plan for the awarding of pins and certificates for the satisfactory completion of each unit of work.
3. It provides a progression and record plan for systematic work and study in the various types of shop.
4. It provides for individual progress of the student.
5. It provides for teaching boys how to do various practical construction and repair jobs around the home that every man or boy should be able to do regardless of what his future vocation may be.
6. It provides a hobby.
7. It stimulates one form of the proper use of leisure.
8. It provides safety instruction in each unit of work and causes each student to become safety conscious.
9. It provides a plan for checking up on actual safety practices of each student.
10. It requires a pledge to acquire the following qualities: industriousness, reliability, coöperativeness, accuracy, and speed.
11. It provides a plan whereby a check is made on each boy, by the boys themselves, as to whether he is demonstrating these qualities.
12. It provides a constructive program to satisfy the boy's gang instinct.
13. It provides a program for the industrial club period in the school.
14. It provides a plan whereby the boys will want to explore a wide range of occupations.
15. It provides a plan to secure information regarding occupations.
16. It provides for a vocational-guidance counseling program.
17. It develops a technique whereby boys will be able to make occupational studies in the vocation of their own choice.
18. It solicits the coöperation of civic groups in each community.

The Club Period

Junior mechanics provides a program for the club period. Each club elects a board of directors. They, in turn, elect officers and transact the business, provide for committees and for special programs. The activities of the club are too numerous to list in this short article. One of the interesting features for the club period is the initiation of new members and the awarding of degrees with appropriate ceremony outlined in the "Club Ceremonies."

Organization Summary

Each local club is a boy's organization. The state organization is composed of a group of teachers of this clubwork in each state. The national organization will be completed at a later date. Until the national organization can be completed, the author of this article is acting in this capacity and has made provision for the distribution of all the junior-mechanics material.

Editor's Note: Additional articles will appear in succeeding issues, outlining the state and national organizations for the club program, also articles on the standards set up for the various units of work.

Teachers who are interested in clubwork will save a great deal of time and worry if they get first-hand information from the author of this article. He has a program that has been thoughtfully developed, and that can be applied at once.

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[1]This material is taken, in part, from the *Junior Mechanics Hand Book* (1931), by P. L. Cressman.

*Department of Public Instruction, Harrisburg, Pennsylvania.

Pupil-Personnel Organization

Harold J. Davison and Earl L. Bedell***

IT has been said that there are two classes of workers out of employment: (1) the less efficient, less liked worker and (2) the unfortunate worker who has been working under an inefficient management. It follows that the skilled worker must become more efficient if he wishes to hold his job. He must become more efficient, not only as a worker, but as a social being. It must also be recognized that the managing executive is directly responsible for the jobs of his subordinates. It follows, therefore, that social efficiency and management are important factors of success.

The School's Responsibility

The first industrial training received by prospective workers and administrators is in our junior high schools. It is imperative that this initial instruction be given in such a manner that the vital factors of social efficiency and management will be emphasized. Former methods took only the development of skill into account. It is evident that some of the essential factors of success were overlooked. One of the handicaps in American industry is the untrained industrial worker who cannot see beyond the immediate operation which he is performing. Frequently this type of worker becomes dissatisfied and disgruntled and fails to realize that the only barrier to promotion is his lack of social effectiveness.

Many of our industrial leaders maintain that one of their more difficult problems is to find men with the required skills and technical information to assume positions of responsibility. This problem, however, is relatively insignificant compared with that of securing men adequately equipped with skill and knowledge who at the same time have a healthy social outlook. Because of this difficulty, our present and future wage earners must be given an education that will develop within them such manipulative skills as are required in industry. They must have, at the same time, a keener appreciation of their social responsibilities. To develop skill without developing the ability to work effectively in the social order to which one will be exposed is rather an ineffective type of training for the prospective worker.

Pupil Organization Provides Social Training

Practice in social adjustment can be given in the school shop by a pupil-personnel organization. The shop conditions may be made similar to those found in industry. In this way the individual boy will find himself in a situation in which social compatibility is not only desirable but necessary. Of necessity he will be forced to develop the ability to get his classmates to work with him as well as for him. Social effectiveness can be given concrete measure.

Pupil-personnel organization consists of a superintendent, numerous division foremen, safety engineer, record clerk, and tool- and stockroom attendants. By frequent and systematic rotation each boy has the opportunity of directing and being responsible for some particular unit. On the other hand, because of his participation, each boy working in a given group has a better appreciation of the meaning of coöperation and the necessity of conducting himself according to certain rules and regulations. He is unconsciously developing those traits so essential to the successful industrial worker.

Every Boy Receives Training in Leadership

Each position in this organization carries with it definite duties and responsibilities. A system of rotation gives each boy an opportunity to develop these leadership characteristics. It is to be noted that every boy, no matter what his natural inclinations may be, receives this desirable training. When it is practical to do so, the foremanship of a group is given to a boy who has shown marked ability in that division of the work. Each new encumbent serves one day apprenticeship under the retiring officer. Ordinarily, a boy holds his position for one week, although this period may vary as conditions seem to justify. The foremen are expected to give assistance to the boys under them. This duty is always kept in mind at the time of assigning positions. Choosing the foremen in this manner serves to stimulate the boys to do exceptional work in the groups in which they are particularly interested.

During a semester of twenty weeks it is impossible for each boy, in a class of sixty, to hold the coveted position of superintendent. This position is filled by the boys who have shown themselves to be superior foremen. Such an incentive is much more conducive to good work than are mere merit marks.

The Student Superintendent

The superintendent, as the name implies, has general supervision over the entire shop. His is a full-time job. Some of his specific responsibilities are:

Supervising the entrance of the boys into the room.

Calling the class to order.

Directing the taking of attendance by the record clerk.

Assisting in the assignment of boys to various groups.

Filling temporary vacancies in the pupil-personnel organization, caused by absence.

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**Assistant Director Vocational Education, Detroit, Mich.

Setting the boys to work.

Assisting foremen in adjudicating any difficulties which might arise.

Supervising the work of the other members of the organization.

Assisting the instructor whenever possible.

Seeing that the rules and regulations of the shop are observed.

General supervision of the shop and the routine details.

At the close of the period he:

Receives the report of each of the other members of the organization, taking note of any irregularities.

Checks up on the condition in which each unit is left.

Directs the storing of projects and individual equipment.

Has *his* report checked by the instructor.

Dismisses the class.

Although it is impossible for each boy to act in the capacity of superintendent, the class as a whole is instructed concerning the duties and responsibilities of this position. It is well to keep in mind that the success of any such plan of organization is dependent upon the fairness with which the positions are allotted and the appreciation, by each boy, of the other fellow's job.

Making the Industrial Visit Worth While

*E. C. Wittick**

A Visit to an Industrial Drafting Room

FREQUENTLY the industrial field trips are conducted in a haphazard manner. Pupils and teachers alike seem to regard these affairs as a bit of holiday entertainment. Under such conditions very little good is attained by these visits, as much precious time is lost, and many invaluable opportunities for instruction are missed.

The industrial visitation, however, may be made a most valuable part of the shop or drawing course. Properly conducted, these visits possess much guidance value. They should also give the student industrial information, and add to his fund of general information. No course is complete, nor can it be called completely successful, unless it is tied up to its industrial counterpart. What student in mechanical drawing for instance, will not be thoroughly interested when he sees draftsmen at work using the same tools, materials, and equipment that he himself is using in school? The student will not, however, notice all the similarities that exist between the school and the industrial drafting room unless these are definitely called to his attention. Many of the things done in the school drafting room that seems futile and useless to the pupil, take on a new meaning when he sees them done under an industrial environment.

The following suggestions may be helpful to drafting teachers, in making industrial visitations more profitable to their students. They show how the teacher may lead his students to look for something definite and worth while.

General Directions

1. A definite aim should be set up for the visit. In this case it should be the gathering of the information asked for in the questions which follow.

2. Preliminary arrangements should be carefully made. The teacher should arrange with the superintendent of the plant for a proper time and length of visit. The visit should be discussed in class on the day before the visit, using the following questions as an outline.

3. The answer to the questions should be written by the pupils immediately after the visit, if possible, because then their observations are still remembered. The written papers should be discussed in class on the day following the visit.

4. The work of the drafting room which is visited, must under no condition be interfered with. To accomplish this, the pupils should be warned against causing disturbances. They also must be instructed to avoid asking questions. Unless this is carefully attended to by the teacher, industry will not welcome these visits.

5. The following questions are given in such form that all information desired in them may be gained through observation alone. The pupils should be asked to copy the four main headings on a card, so that this may be used as a guide during the visit.

Questions

I. *Working Conditions*
- A. *Light*
  1. Is the lighting artificial or natural?
  2. Is the light too bright or to dim?
  3. From what direction does the light come? (A natural north light is best.)
  4. Which way do the men face in relation to the light?
  5. Do the men wear eye shades? (The wearing of eye shades is not necessary if the light is correct.)
- B. *Heat and ventilation*
  1. How is the room heated? (Any form of even heat is good if there is sufficient moisture in the air.)
  2. What provision is made for ventilation? (Natural ventilation is best in most cases.)
- C. *Sanitation*
  1. Is the room clean? (There is no excuse for a dirty drafting room.)
  2. Do any outside influences or industries near by tend to affect the sanitary conditions of the drafting room, or the health of the workers?
  3. What kind of toilet facilities are provided?

*University High School, The University of Chicago, Chicago, Illinois.

D. *Lay of room*
1. Does it look like the school drafting room?
2. Does it look like a pleasant place in which to work?
3. Would you care to spend the greater part of your working days in such an establishment?
4. Are there separate offices for the chief engineer and chief draftsmen?
5. Make mental notes of the arrangement of the equipment so that you can reproduce it in a sketch.
6. Sketch the room arrangement.

II. *Personnel*
1. What is the apparent age of the men employed at various tasks?
   a) Blue printer? e) Layout men?
   b) Tracers? f) Designer?
   c) Detailers? g) Chief draftsmen?
   d) Checkers? h) Chief engineer?
2. Do the workers have an attractive personal appearance?
3. Do the workers appear to be interested?
4. Do the workers appear to be healthy?
5. Do the workers wear glasses as a general rule?

III. *Nature of the Work*

A. *Kind of drawings being made*
1. Are drawings being made with pencil on tracing paper?
2. Are drawings being made in ink?
3. What is the nature of the drawing?
   a) Architectural? d) Map?
   b) Machine? e) Woodwork?
   c) Electrical? f) Any other kind.
4. What kind of lettering is used? Style? Vertical or slant?

B. *Activities besides drawing*
1. What others besides draftsmen are employed in the office?
2. Do you see anyone doing work other than drawing? (Checking, writing specifications, doing experimental work?)

C. *Drawing helps*
1. Do the men use notes, sketches, or models to refer to in their work?
2. Do the men consult each other frequently or do they work alone?

IV. *Equipment and Materials*

A. *Furniture*
1. What kind of drafting tables and stools are being used?
   a) Adjustable or not adjustable?
   b) New or old?
   c) Manufactured by?
   d) Metal or wood?
   e) Solid or shaky?
2. Are bookshelves provided?
3. Are there any other pieces of furniture besides the drafting table and stools?

B. *Materials*
1. What material is used to draw upon?
   a) Detail paper?
   b) Tracing paper?
   c) Tracing cloth?
2. What kind of pencils are used?
3. What kind of erasers are used?
4. What kind of ink is used?
5. Are the title spaces and border lines already printed on the sheets before the draftsmen get them?

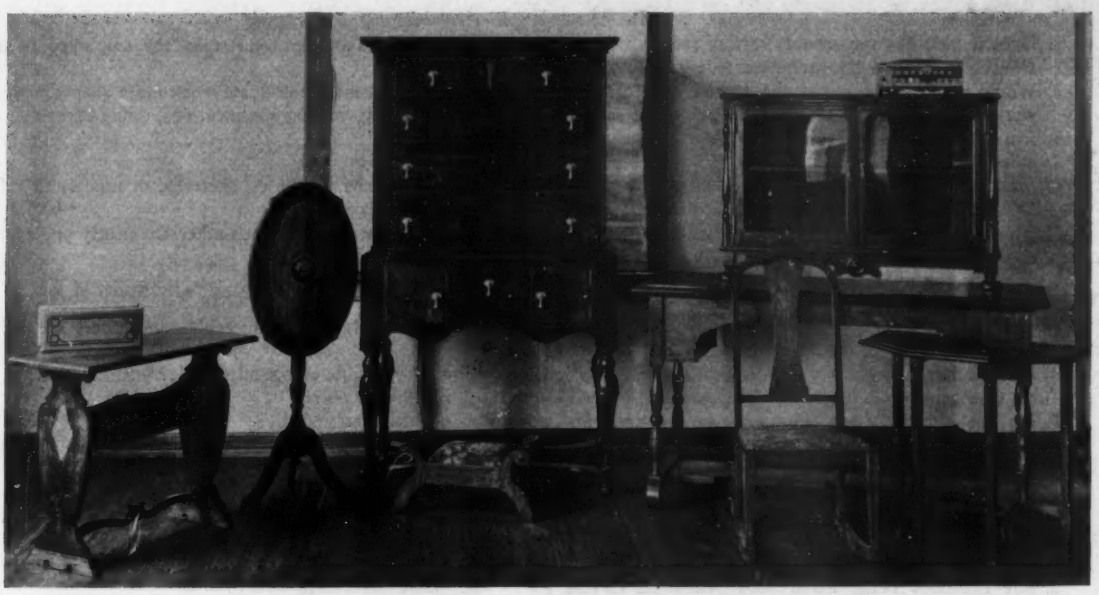
Junior-High Manual-Arts Contest

*J. I. Sowers**

ABOUT a year ago, the problem of interest as a factor in the motivation of shopwork was taken up at our teacher-improvement meetings. The result of this study was published on page 333 of the September, 1930, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. From this study it may be seen that competition of class against class, or school

*Director Industrial Education, Miami, Florida.

THE ABOVE PICTURE ILLUSTRATES SOME OF THE PRIZE-WINNING WORK OF THE ANNUAL EXHIBIT OTHER THAN THAT MADE IN THE SCHOOL WINNING THE CRAFTSMANSHIP CUP FOR THE YEAR



THIS PICTURE SHOWS A PART OF THE EXHIBIT OF THE ADA MERITT JUNIOR HIGH SCHOOL. THIS SCHOOL WON THE PHILLIPS' SILVER CUP FOR HAVING THE MOST OUTSTANDING WORK IN THE ANNUAL EXHIBIT

against school, was one of the best means of using the natural instincts to motivate shopwork. This type of motivation is the basis of all games and sports, and is readily adaptable to shopwork.

In a county unit system, such as ours, which has school shops scattered through Miami, Coral Gables, Miami Beach, and a number of smaller towns and country districts, the problem of finding an equitable and fair basis on which to compete is a difficult one. In the first place, the equipment in the various schools is quite different. Some shops have power machinery, some have none. Some are rather well and fully equipped with a number of different machines, some have only a power saw, etc. Naturally this would place a handicap on some schools. In order to circumvent these conditions, and in order to have the value of a county-wide contest, rules and regulations were made to make the contest as fair to all as is possible.

Then too, the contest had to be restricted to woodwork, since this is the only kind of work for which all the shops in the county are equipped.

To take care of all of these factors, the following plan for the contest was worked out by a teachers' committee:

Seventh and Eighth Grades

1. One project to be chosen from the "required list" in blue-print book.
2. One project to be chosen from supplementary list in blue-print book.
3. One project to be original or made from any source outside of blue-print book.

Ninth Grade

1. Two projects to be chosen from any part of blue-print book.
2. Two projects to be original or taken from any source other than blue-print book.

NOTE: Each school may enter as many projects as desired. The judges will select the ten best projects from each school, i.e., three from grade seven, three from grade eight, four from grade nine. The judges will then select the winners for the awards as follows:

AWARDS[1]

Student Awards

First place in grades 7, 8, 9 and for most outstanding job — Gold Medal.

Second place in grades 7, 8, 9 — Silver Medal.

Third place in grades 7, 8, 9 — Certificate of Award.

School Award

To the junior high school winning the most points in this contest will be given the Phillip's Trophy Cup for Craftsmanship award for the best work of the year.

This contest was confined to the junior-high grades with a separate contest for high schools confined to mechanical and architectural drafting. There is so wide a variety of work offered in our high-school shops that it has seemed impossible to get them together in a shop contest.

[1]The cup for craftsmanship is given to the schools annually by a citizen of Miami, and the gold and silver medals are supplied by the local Rotary Club.

MUTUAL INTERESTS

How to get the employer and the employee on a mutual-understanding basis is one of the fundamental problems of the country. If each helps the other, there should be no war between them. The fundamental thing in getting men together is to get them working together and thinking on the same thing. — *J. A. Yates.*

THE USE OF ENGLISH

When the English language is taught, not only by those specially employed for that purpose, but by all teachers in the school system, then there will be less criticism from the public that high-school and college graduates cannot meet the requirements demanded in business and industry. — *F. T. Struck.*

SAFETY INSTRUCTIONS

Woodworking Lathes

This machine is dangerous unless you observe the following:

1. **Keep the tool post as close to the work as possible.**
2. **Turn on the power only after making sure that the material to be turned is held securely.**
3. **Hold your tools tightly in your hands.**
4. **Never put your hand around revolving pieces to see whether they are round.**

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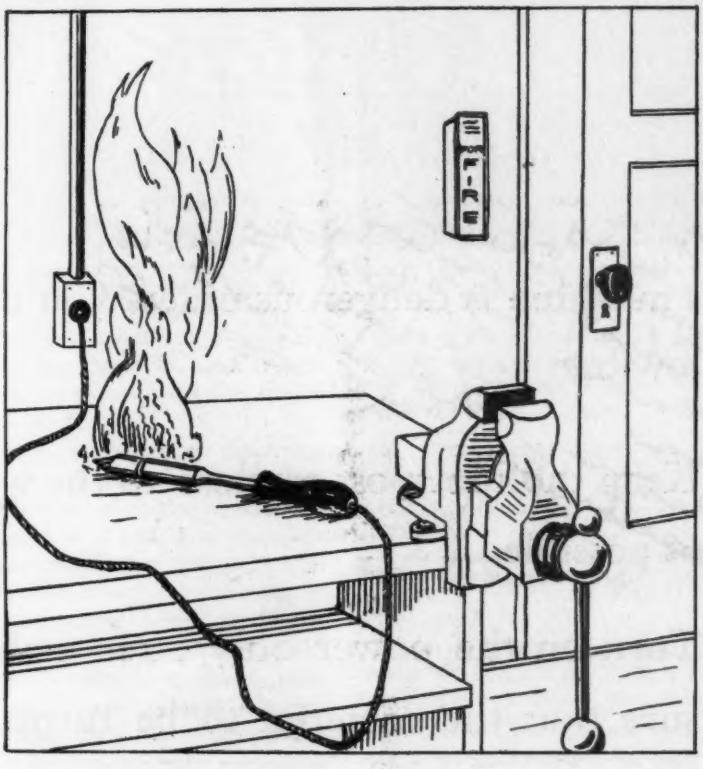
Submitted by Lyle M. Garnett, Milwaukee, Wis.

A FIRE HAZARD



A hot soldering iron, and especially an electric one, should not be laid on a wooden bench top.

Always place a hot iron on an approved metal stand.

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Submitted by Jos. J. Lukowitz, Milwaukee, Wis.

PROBLEMS & PROJECTS

FLYING SILHOUETTE AIRPLANES

Terence Vincent, U. S. Director of Miniature Aircraft Fliers, Kansas City, Missouri

The silhouette of a flying fish, of a duck, or of a goose, may be made life size of balsa wood, attached to a suitable motor base, equipped with wings, elevators, and propeller, and actually flown. Experiments show that any live thing, whose body silhouette is not shorter than five times it height, can be flown with results that satisfy the ordinary onlooker; while the appeal to the child who makes or owns such a flying "thing" is tremendous.

Part	*Weight*	*Dimension*	*Material*
Propeller, finished	14.5 gr.	½ by ¾ by 6 in.	Balsa
Motor (4-strand)	95.4. gr.	88 in. of ⅛ in.	Flat Rubber
Motor base mounted on fish silhouette	153.4 gr.	5/16 by 5/16 by 24 in.	Balsa
		⅛ by 1¾ by 23 in.	Balsa
Elevator	24.0 gr.	1/20 by 1¼ by 12 in.	Balsa
Wing	77.0 gr.	1/16 by 2 by 24 in.	Balsa
Rubber bands (4 No. 10)	4.6 gr.	No. 10	Para Rubber
Completed flying fish	368.9 gr., or about 4/5 oz.		

If the total weight, as added up from all the separately weighed parts, is within 10 per cent of the weight of the entire skycraft as a unit, it will probably be satisfactory if the flying design is correct throughout. The foregoing weights and dimensions are from an actual flying fish that was made and flown for a month or two, yet there are other weights and sizes that may be used in making such a flying fish which will produce one that will fly farther and better.

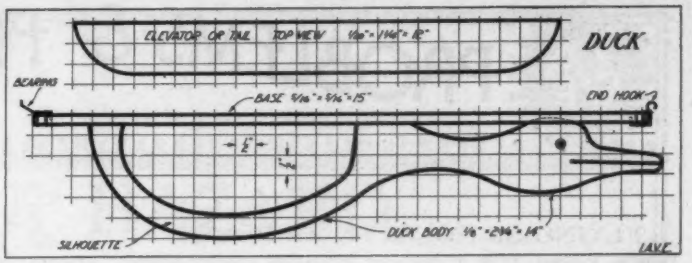
THE UPPER ILLUSTRATION SHOWS AN ASSORTMENT OF SILHOUETTES THAT MAY BE USED IN THE MAKING OF AIRPLANES. IT ALSO SHOWS THAT EITHER SHORT AND STUBBY, OR LONG, SLENDER WINGS MAY BE USED ON THE SAME SILHOUETTE

THE LOWER PICTURE SHOWS A SCISSOR SHARPENER BEING USED TO WIND UP THE RUBBER MOTOR OF A DUCK AIRPLANE. THE SHARPENER HAS A 11:1 GEAR RATIO, HENCE IT WINDS 11 TIMES AS FAST AS COULD BE DONE TURNING THE PROPELLER BY MEANS OF THE INDEX FINGER ALONE

Of course, the question of weight must be carefully considered. Those used to making skycraft that fly well and far may lack the patience to make these flying fish and geese sufficiently strong and durable to fly in an ordinary school or home yard, and may become dissatisfied and consider their experiments at making them as valueless.

For best results it is well to use chemist's or pharmacist's scales in order to obtain the exact weight of each part of a skycraft. Here are the weights of the flying-fish parts:

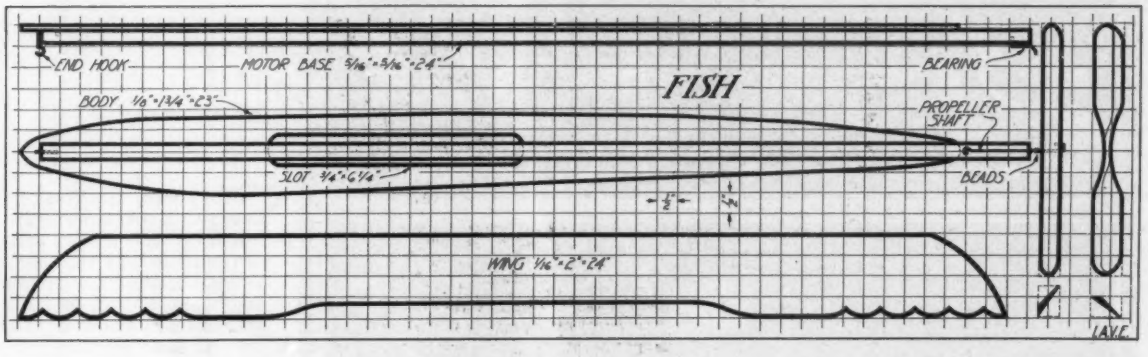
The weights given should be looked upon merely as guides. If the individual parts are within 10 per cent of these weights, and the design remains aëronautically correct, the silhouette aircraft will fly satisfactorily.



To check the weights, it may be well to fashion metal or wood pieces that weigh just as much as the separate parts of the aircraft to be made. As each part is finished, it can be compared with its corresponding weight; if too heavy, it may be sanded off; or if too weak structurally and too light, it may be made stronger.

Sometimes a scale-balance, made of a meter stick or a yard-stick, serves adequately when hung by its exact weight-center. The aircraft part may then be hung on one end, and its weight equivalent on the other, and the lightness or degree of overweight of the part determined rather quickly.

The duck silhouette weighs 37.15 grains, and mounted on its balsa motor stick, it should weigh 83 grains. The silhouette is made of balsa wood, ⅛ by 2½ by 14 in., and its 45.85-grain stick complete with end-hook and rear bearing, measures about 5/16 by 5/16 by 15 in. The flying duck uses the same elevator, wing, and propeller that was used on the fish, thus bringing the total weight of the duck up to 254.3 grains or slightly over ½ oz.



For the construction of the several parts see the article by A. F. Scribe on page 184 of the May, 1929, issue of INDUSTRIAL-ARTS MAGAZINE. The wire parts, propeller, and wing are essentially the same as those described in that article. As a reminder, a few words of further explanation are offered:

1. The propeller is carved M.A.F. (flat bladed) style, from a soft balsa block, ½ by ¾ by 6 in. It should weigh 14.5 grains when completed.

2. The elevator is a firm piece of balsa, 1/20 by 1½ by 12 in., with or without a slight evenly curved dihedral. Its weight should be 24 grains.

3. The wing may have a variety of widths and lengths, but a piece of balsa, 1/16 by 2 by 24 in., with a 3-in. dihedral, and weighing 77 grains, makes a very efficient wing for either of these projects.

4. The silhouettes are carved out of ⅛-in. balsa, the duck from a piece 2½ by 14 in., and the fish from a piece 1¾ by 23 in. They weigh, respectively, 37.15 grains (duck), and 80 grains (fish). The fish silhouette has a ¾ by 6-in. hole cut out 6 in. from the nose. This is for the purpose of allowing the wing to project through the silhouette, so that it may be adjusted forward when more "lift" is needed to attain a level flight, or to either side when flying-control laterally is needed.

5. The motor bases of 5/16-in. square firm balsa wood should be 15 in. long for the duck (weighing 45.85 grains), and 24 in. for the fish (weighing about 73 grains). Each should have the conventional rear-bearing and front end-hook for pusher-planes. The motor on the duck's base operates on top and above the silhouettes, while the motor on the fish base operates on the side.

6. The fish motor of 4 strands, weighing 95.4 grains and measuring 88 in. of ⅛-in. flat para rubber, showed double knots when wound by hand 230 turns, and it broke at 660 turns. The 3-strand, 45-in. motor for the duck, weighing 51.2 grains, imparts a good flight, but more speed may be had from the 4-strand motor with 54 in. of rubber. The fish motor may be made a 3-strand at 78.5 grains and 70 in. long; or a 5-strand at 110.8 grains, and 109 in. long; or a 6-strand at 133.25 grains, and 130 in. long. Clearly, here there was some "stretching," since the weights and lengths do not progress uniformly.

7. With the base mounted on the duck silhouette, the weight is 83 grains.

8. With the base mounted on the side of the fish silhouette, the weight is 153.4 grains.

9. Completed, ready to fly, the fish weighs 370 grains, and the duck weighs 255 grains.

Reviewing these two flying pusher-planes, these additional thoughts in summary are offered:

1. Reprints of the essentials of the May, 1929, article, are available from the Miniature Aircraft Fliers,[1] for a dime, for those who need fundamental instructions and illustrations in simple wire bending, propeller carving, and flying of pushers or pullers.

2. The art department may be asked to coöperate in determining the proper coloring, or to devise additional silhouettes of live things which may be made to fly in this way. *All* proportions, as to length and width, may *not* be made to fly; but those as long as the ones revealed in this article, may be made thinner in width with even better flying results.

3. Coloring balsa wood is a delightful experiment itself. The problems consist principally of *not* adding weight to the flying machine, through the color substance; and getting the right hues in the right places.

4. The silhouettes here offered are suggestive, and are not to be taken as exact contours of any wild fowl or fish. Children who have seen these in flight have called them the duck and barracuda. Others suggested are flying squirrel, eel, dragon fly, and channel catfish.

5. Fish silhouettes have been flown with the motor on top, and some with the motor on the bottom. Probably some can be flown with the motor operating through the body of the fish without any motor base or other reënforcement except at the ends.

[1]Box 6835, Parkway P.O., Kansas City, Mo.

6. Should the skycraft dive consistently, and the wing cannot be moved further forward, then insert a match-stick section between the trailing edge of the wing and the motor base in such a way as to tend to make the plane climb in flight. *Or* depress, similarly, the leading edge of the elevator.

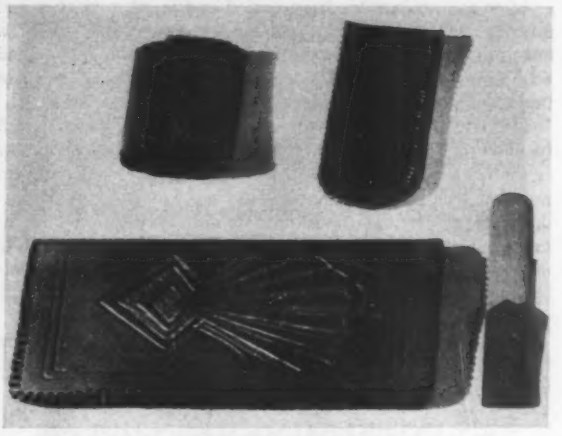
7. Wing and elevator are attached by fitting rubber bands around them and the motor base quite snugly. The wire-clip method might be used, but that prevents the side-to-side adjustment which is so frequently desired with flying things.

8. The motor base may be cemented to the silhouette, or it may be attached with steel wire (.02 in. or No. 8) clips. In case of the clips, you may develop a series of silhouettes that can be flown on the same motor base. This requires a uniform set of steel clips with which to attach the shapes to the motor base. Some may be on top of the base, some on the side, and some under, depending on the ingenuity of the builder.

LEATHER CRAFTWORK

Ross C. Cramlet, Junior-Senior High School, Newton, Iowa

During an economic period such as we are going through at the present time, we are faced with the problem of what to recommend as related crafts in connection with our regular shop courses. Whatever we may suggest must be of some utility value in order to justify the cost.

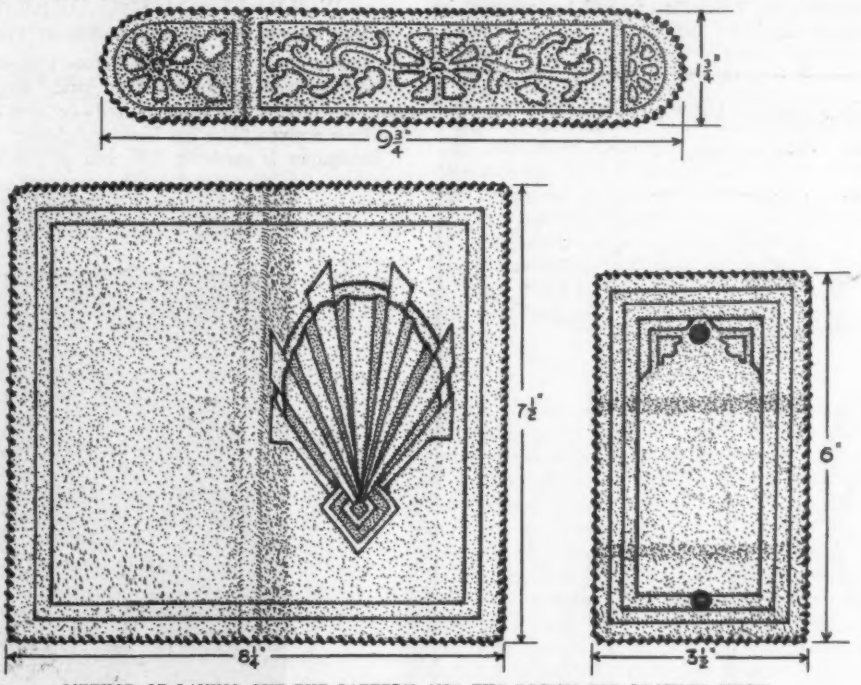


LEATHER PROJECTS FOR BEGINNERS

Every boy or girl possesses or has need for articles made of leather. Many of these can be inexpensively made, and the tools needed are few and of low cost.

For beginners in leather work, simple, well-designed articles are required. The projects illustrated show a sheath for a paper cutter, a key-ring case, a comb and nail-file case, and a letter folder case.

The first step in making any of these articles is to draw a paper pattern to exact dimension. After this is drawn, the student has to work out a simple design which is placed right on the pattern. The next step is then to select the leather, and to cut it. For beginners, calfskin is quite suitable as it is thick enough to tool easily. The paper pattern is placed on the leather and the article is cut out with the least amount of waste. Next, the leather is moistened, not soaked, with a sponge and water until it is soft. The design is then gone over with a tracing tool bearing down with enough pressure to make an impression on the leather. After the tooling is completed, the next step is to decide what type of thonging would be suitable. The best thong is made of thin goatskin. The strongest will be those cut the length of the skin from tail to neck. The long ones, which always have weak places due to thin spots on the hide, are cut continuously from a large round piece of hide. If thin spots occur in the thong that is to be used, they should be detected before they are used so that they may be spliced accordingly. Insist when you purchase lacing that they will stand a reasonable amount of tension. The most useful width will be ⅛ in. The distance between holes should be the width of the thong. The spacing of the hole can be made with a tracing wheel along the edge of the rule.



METHOD OF LAYING OUT THE PATTERN AND THE DESIGN FOR LEATHER WORK

The most common material used for lining is sheepskin. This may be obtained in a variety of colors so that it may be matched to any material used on the outside. A lining gives a project a more finished appearance and should be used where the inside of the article shows.

After the project has been tooled and laced, scratches and inferior places on the leather may be worked out with a burnishing tool. A leather dressing should then be applied and rubbed briskly. If this is done properly, it will add much to the appearance of the project.

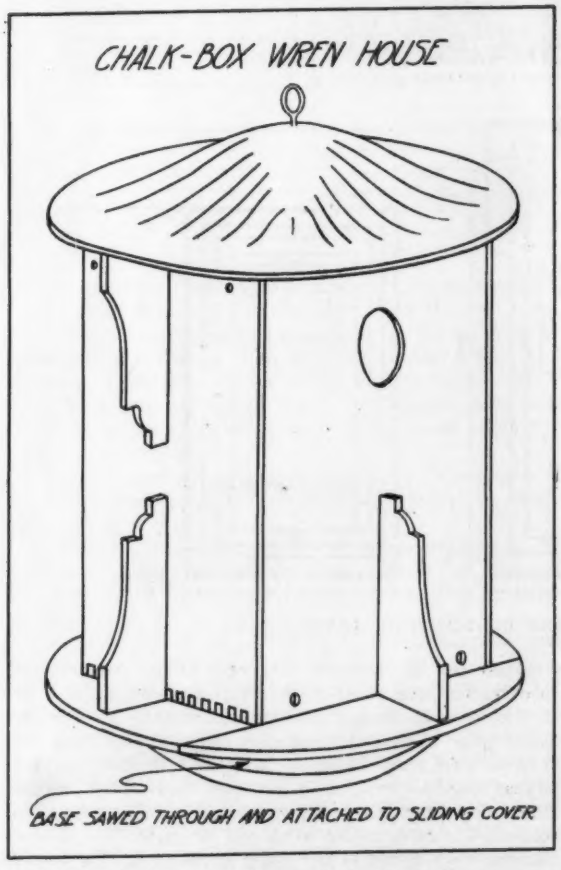
The one point which should always be emphasized is not to allow a beginner to start on too difficult a project. If he is interested and artistically inclined, he will advance very rapidly. There will be ample time for him to tackle more difficult projects. If he is not artistically inclined and his first project is a poor job, he will not have wasted a lot of material. The material cost may be controlled for beginners by purchasing leather scraps by the pound from leather companies.

The average boy, however, is very much fascinated with the material itself and he becomes more interested when he finds that he can take it and mold it into useful articles.

AN INTERESTING WREN HOUSE

A. V. Hanel, Boys' Technical High School, Milwaukee, Wisconsin

The accompanying illustration gives an idea of what can be done with the lowly chalk box. As shown, it has been converted into an attractive wren house, by adding a dome and a base, and by placing brackets on the bare side walls. If a lathe is not available, the disks for top and bottom may be sawed out by hand.



This simple but interesting project affords enough opportunity and skill to attract the average student. He can put into it all his individual taste and creative effort.

The entrance hole, 1⅛ in. in diameter, is bored through the upper half section of the sliding cover which is held in place with two screws. The screws, when removed, expose the nest for observation and cleaning after the brooding season. Ventilation holes, ¼ in. in diameter, should be drilled about 1 in. below the overhanging deck. There should be several of these.

Contrary to many expressed opinions, attractively designed and colored bird houses do not discourage the birds from nesting. It is only when the design conflicts with the general requirements of the bird, that it avoids using such a house. Paint or oil stains have a tendency to leave unpleasant and irritating odors which birds dislike very much, and which discourage them from nesting. If oil paint or stain, therefore, has been used on the house, it should be allowed to weather some time, to kill the harsh odors. If the builder wants the birds to use his house the first season, he must cater to the birds' likes and not his own.

Quick-drying, colorful lacquers have been highly perfected. When brushed on a shellacked base they dry with a hard luster, and really make a bird house very attractive, at the same time adding beauty to the back-yard garden. Because the odor of these lacquers disappears quickly the birds may be expected to choose houses decorated with them the same season they were constructed.

The things of paramount importance are the area, size of entrance, snugness, and ventilation. Bird houses should be put up in a semishady location, and not where they are exposed under an all-day blistering sun.

WOOD-FINISHING OPERATIONS

Herman Hjorth, Saunders Trade School, Yonkers, New York

Sanding must often be done before a piece of work is completely finished, because certain parts may be inaccessible after assembling. But it should only be done after all the toolwork on a given piece has been completed.

Sandpaper is made in rolls and in 9 by 11-in. sheets. It consists of finely ground quartz cemented to a strong, heavy paper, and is graded according to fineness; the coarsest being No. 3 and the finest No. 7/0. For ordinary work the first

RUBBING SANDPAPER OVER THE EDGE OF BENCH TO TAKE THE STIFFNESS OUT OF IT AND MAKE IT EASIER TO FOLD

sanding may be done with No. 1 or No. ½ sandpaper. This should then be followed with No. 0 or 2/0 to produce a smooth surface.

Rules for Sanding

1. Complete all work with edge tools before sanding, because minute particles of quartz become imbedded in the wood surface and immediately dull edge tools.
2. Divide a 9 by 11-in. sheet into four parts by folding it and tearing it over the sharp corner of the workbench. The coarser grades fold easier when the back of the paper is first rubbed over the edge of the bench.
3. A cork block about 1 by 2½ by 3½ in. over which the

sandpaper may be stretched and held with the hand should be used when sanding both surfaces and edges. With this block, more pressure can be applied and a better surface produced. A block of soft wood may be substituted for the cork, but hard wood should not be used.

TEARING SANDPAPER ALONG A FOLD OVER THE EDGE OF THE BENCH

4. Always sand *with the grain* of the wood. Even the finest scratches across the grain show badly through the finish.

5. Concave surfaces may be sanded with the sandpaper wrapped around a round stick or a file.

SANDING A FLAT SURFACE. ONE QUARTER OF A SHEET FOLDED OVER A CORK BLOCK

6. Two or more boards having identically curved edges should be clamped together while they are being smoothed and sanded.

7. Avoid rounding the corners on flat surfaces and edges.

8. Never sand edges to be glued or parts of a joint, because a perfectly flat surface can only be produced with an edge tool.

Inspecting Surface Before Finishing

It is of utmost importance to prepare a surface well before applying the finish, since a good finish can be produced only on a perfect surface. Check the following points carefully:

1. *Holes* or *cracks* should be filled with crack filler, also called stick shellac. It is composed largely of shellac and rosin, and is sold in sticks of different colors. It resembles sealing wax and is melted into the hole or crack to be filled either by holding a lighted match to it or a heated iron. It hardens almost instantly and is leveled off with the surface with a scraper or chisel, and sandpaper.

SANDING CURVED EDGES WITH SANDPAPER WRAPPED AROUND A FILE. TWO BOARDS WITH IDENTICAL CURVES ARE CLAMPED TOGETHER WITH A HAND SCREW

2. *Dents* in a smooth surface are often caused by carelessness or accident while working. They may often be completely eradicated by placing a piece of waste soaked with water over them. The water fills up the cells in the wood causing them to swell so that they rise up level with the rest of the surface. When dry, sand the wetted part of the surface.

3. *Glue spots,* especially around joints, should be carefully removed with a chisel or scraper, and sandpaper. It is very important to remove every trace of glue, because it prevents the stain from coloring the wood and therefore leaves a light mark on a stained surface.

4. *Oil* or *grease* spots also prevent stain from penetrating the wood. Such blemishes may be removed by rubbing them with a rag or a piece of cotton waste moistened with naphtha or benzine.

Applying Stain

Stain is a transparent color applied on wood to improve its appearance or to imitate the natural color and age of more costly woods. Most stains are made from aniline colors. Some of these are soluble in alcohol (spirit stains), some in turpentine (oil stains), and some in water (water stains). Oil stains and water stains are more commonly used. Water stains give a clearer color than oil stains, penetrate deeper into the wood, and do not fade. They have the disadvantage of raising the grain of the wood. This can be overcome by sponging the wood with clear water and sanding it with fine sandpaper after it is dry. Water stain is sold in powder form. This is dissolved in hot water according to manufacturers' directions. If the stain becomes too dark, it can be made lighter by adding water, either hot or cold.

Directions for Staining:

1. Brush with the grain, applying the stain quickly and evenly.

2. Brush along the entire length of a surface to prevent laps.

3. After dipping the brush, begin on the unfinished part and work toward the finished part.

4. Wipe off surplus oil stain, but keep brushing water stain until it is almost dry.

Filling Open-Grained Woods

The pores or openings in wood are filled to produce a smoother surface. Filling is indispensable when a high polish is desired. Wood filler is a paste composed of gums, shellac, powdered quartz, and sand ground in linseed oil and other

substances. It is used to fill the pores of open-grained woods, as oak, chestnut, mahogany, etc. The paste can be obtained in various colors to correspond with that of the stain.

Directions for Applying Paste Wood Filler:

1. Thin the paste with turpentine to the consistency of cream and apply it freely with a fairly stiff brush, both with and across the grain.
2. After drying a few minutes, the filler changes from a glossy to a flat appearance. Rub across the grain with cocoanut hair or a piece of burlap. Remove the surplus by drawing a putty knife with rounded edges along the grain. The knife

SCRAPING OFF SURPLUS FILLER WITH A PUTTY KNIFE

forces the filler into the pores much more thoroughly than can be done by rubbing alone. Remove the filler from corners with a pointed stick of wood.

3. Allow the filler to dry at least 24 hours. Remove the film of wood filler left on the surface by rubbing with steel wool or fine sandpaper, or by wiping with a piece of waste moistened with turpentine. Use as little turpentine as possible, because it softens the filler and may lift part of it out of the pores.

Filling Close-Grained Woods

Close-grained woods, such as birch, maple, and gum, have very small pores; and nonporous woods, such as cypress, pine, cedar, and redwood have no pores visible to the naked eye. A thin coat of shellac is sufficient to fill such woods.

Shellac is produced by an insect, native to India, called the "lac bug." Shellac is sold both in dry and liquid form, to be dissolved and thinned with alcohol. Four pounds of flake shellac dissolved in 1 gal. of alcohol is termed a 4-lb. cut and is the usual stock solution. There are two kinds of shellac on the market, orange and white shellac. White shellac is produced by bleaching orange shellac.

Directions for Applying Shellac:

1. Pour a quantity of the stock solution into a can and add an equal amount of denatured alcohol.
2. Use a rubber-set brush with fairly soft bristles. On vertical surfaces start from the top and work downward. Always brush with the grain.
3. Work rapidly as the shellac dries quickly. Be careful not to let it run over the edges. Pick up such runs with the brush immediately.
4. Allow from two to four hours for drying and then rub down with No. 0 steel wool. Steel wool is especially useful in rubbing down shellac, lacquer, and varnish because it does not gum up.
5. Do not apply shellac over a spirit stain, because it dissolves the color, thereby giving the work a muddy appearance.

Applying a Wax Finish

Wax is made from beeswax, paraffin, carnauba wax, and turpentine. Carnauba wax is extracted from the leaves of a South American tree. Wax is sold both in liquid and paste form.

1. Before applying a wax finish, the surface should be filled. Otherwise the wax is absorbed by the wood and does not produce a lustrous surface.
2. The best results are produced when a coat of shellac is applied on top of the filler. This should be done both on paste and shellac filler.
3. Rub this shellac coat down with No. 2/0 steel wool and apply the wax, either paste or liquid, with a soft cloth. Do not put too much on at a time, because it makes the surface greasy and hard to polish.
4. Allow the wax to dry for about 20 minutes and then rub the surface briskly with a clean, soft cloth.

Applying a Shellac Finish

A shellac finish may be produced both on open- and close-grained woods.

1. The wood is first filled either with paste wood filler or with shellac, depending upon the nature of the grain. The finishing shellac coats are applied in the same way as the filling coat.
2. The first finishing coat should consist of 2 parts of the stock shellac solution and 1 part of alcohol.
3. The second finishing coat is thinned very little or not at all.
4. Allow four hours for drying between coats and rub down after each coat with No. 0 steel wool. Finish the last coat with No. 2/0 steel wool.

Applying a Lacquer Finish

Lacquer is a complex chemical product composed of nitrated cotton, banana oil, alcohol, shellac, gum, etc. Both clear and colored lacquers are manufactured. Lacquer usually is not thinned, although a special thinning fluid is made for each brand of lacquer. These thinners are not interchangeable.

SCRAPING A LACQUERED SURFACE WITH A HAND SCRAPER

Lacquer dries quickly and produces a hard, durable, and brilliant surface. Unless a thin sealing coat of shellac is first applied, lacquer cannot be used over oil stain, paste wood filler, varnish, and paint, because it dissolves these undercoats.

Directions for Applying Lacquer:

1. Apply a thin shellac sealing coat. Allow at least four hours for drying and then rub down with No. 0 steel wool.
2. Use a soft camel's-hair brush and apply the lacquer as

it comes from the can. Use plenty of lacquer on the brush, begin at one edge and complete the first brush width before starting the next. Smooth with light strokes of the brush, being careful to pick up any runs and sags.

3. Apply a second and third coat, allowing at least four hours for drying between coats. No sanding is necessary between coats.

4. Use a very sharp hand scraper and scrape the surfaces lightly. This helps to even up the coats applied and lessens the work of sanding.

RUBBING A LACQUERED SURFACE WITH WATERPROOF SANDPAPER AND OIL. THE RUBBING FELT IS BACKED WITH WOOD

5. Sand with a piece of No. 4/0 waterproof sandpaper. Make a rubbing pad by gluing or shellacking a piece of rubbing felt to a wooden block of the shape and dimensions of a sanding cork. Wipe the surface with rubbing oil and also dip the sandpaper in the oil. Use plenty of rubbing oil and sand with the grain. Finish with No. 7/0 sandpaper.

6. Clean off the surface with a piece of waste, then cover it with sawdust and wipe along the grain, using the hands only. The sawdust absorbs the oil left on the surface.

7. Sprinkle some powdered pumice stone on the bristles of a clothes brush and brush the surface briskly and thoroughly. This removes the last traces of the rubbing oil and produces a fine, satin finish.

8. If a brilliant polish is desired, rub the surface with polishing cream applied with a fine linen rag or a piece of silk hose.

Applying a Varnish Finish

Varnish consists of copal gums dissolved in linseed oil. Copal gum is petrified resin from prehistoric pine trees. These gums are found buried in the ground in certain parts of the tropics. Varnish is thinned with turpentine. It produces a beautiful finish on wood and is used extensively on all fine furniture, pianos, radios, etc.

Directions for Varnishing:

1. Varnishing should be done in a dust-free room heated to a temperature of 80 deg. F. Rub the surface with a rag moistened in turpentine to remove every speck of dust. For the best results, varnish should be applied directly over the wood filler. A shellac under coat often causes varnish to scale.

2. Apply the varnish as it comes from the can, spread it evenly, and finish with light strokes of the brush along the grain.

3. Follow manufacturer's directions as to time for drying. Some varnishes require as much as 48 hours and others only 4 hours. Sand between coats, because varnish does not adhere to a glossy surface. Use waterproof sandpaper No. 5/0 to avoid dust. Soak the paper in water a few minutes before using. Also wet the surface to be sanded.

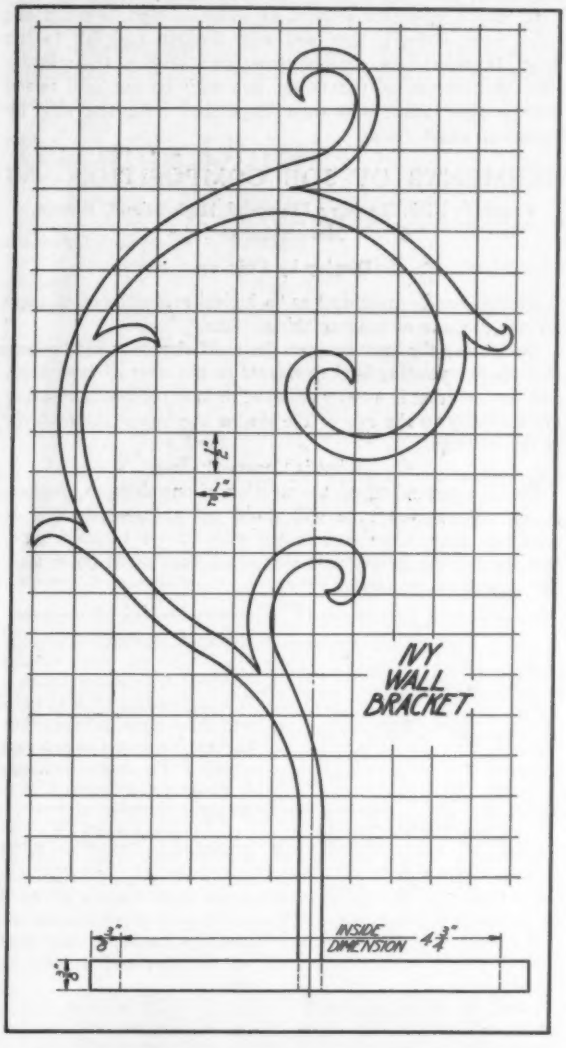
4. Apply three coats and finish the last by rubbing with FF powdered pumice stone and rubbing oil or water. A high polish is obtained by continuing the rubbing with rottenstone, which is finer than pumice stone.

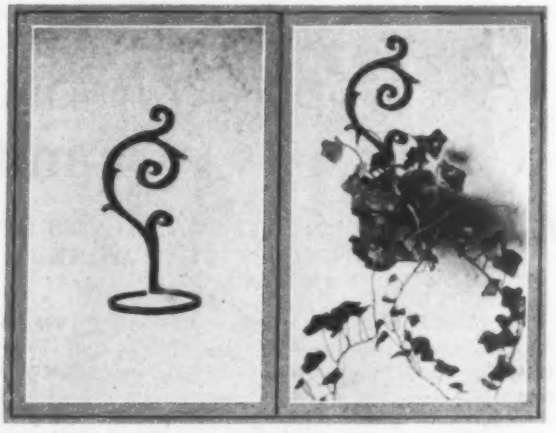
5. Clean the surface and finish by rubbing it with a linen rag moistened with polishing oil.

AN IVY-VINE WALL BRACKET

J. W. Bollinger, Tulsa, Oklahoma

An ivy-vine wall bracket is a very attractive wrought-iron piece to be used on the porch, or indoors in winter. An ivy





AN IVY-VINE WALL BRACKET

vine is quite a hardy plant, and will usually thrive under the conditions mentioned.

The main scroll of the bracket and the ring in which the flower pot hangs, are shaped from one piece of ⅜ by ⅛-in. iron. The smaller scrolls may be either welded to the main scroll, or riveted to it by means of countersunk rivets. The project shown in the picture was given a hammered finish and coated with clear lacquer.

If only a moderate amount of water is used to water the plant, very little, if any, will seep through and fall to the floor. If desired, a shallow sheet-iron disk a trifle larger than the bottom of the flower pot may be cut and raised over a pipe collar, and then suspended from the ring by means of small chains.

ELEMENTS OF JOB COMPOSITION—VI

Frank P. Rich, Roxbury Memorial High School, Boston, Massachusetts

Display by Contrast

Display has been defined as "a logical arrangement of copy for the purpose of making things plain."

Aside from the arrangement, the chief element which enters into display printing is the *contrast in the sizes of type used*, and this contrast is usually resorted to in an endeavor to bring more readily to the eye of the reader the important features in the message.

What is Contrast?

Contrast depends upon the relation of one thing to another. A line of 24-point type will stand out prominently and is relatively large when surrounded with 10- or 12-point type, but place it among a number of other lines of 24-point type and it loses its prominence.

CONTRASTS

A line of small type will stand out prominently when placed alone on a page.

Contrast depends upon the relation of one thing toward another. A ten-story building is a marvel in a town of two- and three-story buildings, but in New York or Chicago surrounded by large buildings it would not be noticed. It is simply a question of

CONTRASTS

Just so with type. A line of 18 point type is relatively large when surrounded by 8 or 10 point type, but place it among a number of other lines of 18 point and it loses its effect.

CONTRASTS

Contrasts

CONTRASTS

Much of our type work contains too much display. In Figure 1 we have a piece of display printing set in a manner calculated to display everything of importance. As you look at the advertisement your eye is attracted first by one group or spot and then by another, in such rapid succession that it all becomes a jumbled mass. In Figure 2, however, it is different. You turn to this advertisement with a feeling of relief; you take it in at a glance. The heading and the signature tell the vital points of the story and they are pleasingly brought out in contrast with the gray tone of the background furnished by the descriptive matter. The heading has been left in the same type as in Figure 1, but the simplicity of the balance of the type causes it to stand out, by reason of the contrast in sizes, much more prominently. And it is largely because of this contrast that the words "are worn by the élite of Chicago" are much easier to read in Figure 2, although set in a size of type much smaller than the original. Of course, the rules on either side tend to set it apart from the other matter, but its legibility is largely due to the contrast in type sizes.

MEYER ALL-WOOL SUMMER CLOTHES

Are worn by the élite of Chicago

They are popular in all of the great fashion centers in America. They are offered to the men of this country at prices as low or lower than they are asked to pay in most stores for commonplace and inferior goods. You will see the force of our arguments as soon as you try these clothes on. The good workmanship and choice patterns must surely appeal to you. You will know what we mean by "clothes that fit and keep their shape."

R. R. MEYER & CO.
127 State St., Chicago

Fig. 1. Where everything is emphasized there is no real emphasis. This advertisement contains too much display.

MEYER ALL-WOOL SUMMER CLOTHES

Are Worn by the ÉLITE OF CHICAGO

They are popular in all of the great fashion centers in America. They are offered to the men of this country at Prices as Low or Lower than they are asked to pay in most stores for commonplace and inferior goods. You will see the force of our arguments as soon as you try these clothes on. The GOOD WORKMANSHIP AND CHOICE PATTERNS must surely appeal to you. You will know what we mean by "clothes that fit and keep their shape."

R. R. MEYER & CO.
127 State St., Chicago

Fig. 2. A resetting of the advertisement show in Fig. 1. It is much easier to read and more pleasing to look at. It is not overdisplayed.

This illustration brings out forcibly the fact that display does not necessarily mean large type, and there are times when a line can be better displayed by small type than by the use of the larger sizes.

A Coöperative Study Fostered by the A.V.A. Committee on Standards

PART VII—A TENTATIVE ANALYSIS OF CEMENT AND CONCRETE WORK

R. W. Selvidge*

The complete plan for this coöperative analysis was set forth in detail on page 189 of the May, 1931, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. The summary is here repeated for the information of those who did not have an opportunity to read the complete statement of the plan.

*University of Missouri, Columbia, Missouri.

Summary of the Plan

In order to coördinate the efforts of a great number of teachers who are engaged in attempts to analyze the various industrial-arts subjects and the skilled trades for the learning units involved, the following plan is proposed:

How the Individual Shop Teacher Can Help

On account of the importance of such an analysis as a basis of effective teaching the following plan for coöperative effort is proposed.

1. Every teacher who is interested in such an analysis should join in this undertaking.
2. All industrial-arts subjects, as taught in the high school, are to be analyzed, for the learning units involved.
3. That the principal skilled trades are to be analyzed for the learning units involved.
4. Tentative analyses of the selected subjects, or trades, are to be published and distributed as rapidly as may seem practicable.
5. Any shop teacher or supervisor who is willing to coöperate, or to offer suggestions in the way of modifying, adding to, or taking from, the original list, should send such suggestions or comments to R. W. Selvidge, University of Missouri, Columbia, Mo., or to William T. Bawden, Peoria, Ill., chairman of the committee.
6. Suggestions thus received should be carefully studied, edited, and incorporated, as far as possible, into the original lists, and the revised lists published, together with the names of those who coöperate.
7. Those who are interested should send in the analysis of any subject, or trade, which they have prepared, and which may be used by the committee as the basis of the preliminary analysis. This form of coöperation will be of great value in getting more satisfactory preliminary lists of units.

In order to get the project started, a tentative analysis of cement and concrete work follows. Those who are interested in coöperating in this matter are asked to study this outline with the view of adding to it anything that should be taught which is not in the list and striking out anything which should not be taught. Teachers should feel free to change the wording of any item to make it more definite, or more inclusive, or more exclusive.

In the study of the tentative analysis the best plan for the teacher is to take some of the jobs which he is using in his shop and analyze them with regard to this list of learning units. Perhaps the easiest way of doing this is to place the learning units in a vertical column, the jobs in a horizontal column, and check each unit in the column in which the job appears. *There must be definite working drawings and specifications for each job, or a correct analysis is impossible.* If it is found that the jobs contain learning units not in the list, such units should be added.

A Tentative Analysis of Cement and Concrete Work

The use of cement and concrete is so general that experiences with these materials are highly desirable from the standpoint of general information as well as from the standpoint of vocational guidance or vocational preparation.

The materials are relatively inexpensive and readily available, and satisfactory and valuable experiences can be secured with them under school conditions. The product is durable, and is valuable if the projects are wisely chosen. Through such experiences we have an opportunity to teach planning, design, some fundamental principles of construction, and the quality, strength, and characteristics of certain materials much used in industry. If we choose our projects wisely, and plan our teaching carefully, we can give many highly valuable experiences through the use of these materials.

The Learning or Teaching Units

The Things the Sudent Should be Able to Do:

1. Plan a form and make a drawing for it.
2. Select materials for forms.
3. Make out bill of materials for forms.
4. Make simple wood forms.
5. Make plaster forms.
6. Make clay forms.
7. Make glue forms.
8. Estimate materials and make out bill of materials.
9. Make a mixing platform.
10. Proportion materials for strength.
11. Make a measuring box.
12. Measure materials.
13. Mix concrete materials by hand method.
14. Place concrete in forms.
15. Make forms secure.
16. Tamp and spade concrete materials.
17. Level with straightedge or strikeboard.
18. Trowel surfaces.
19. Use a groover.
20. Use an edger.
21. Brush-finish a surface.
22. Rub or scrub-finish a surface.
23. Color cement or concrete.
24. Acid wash.
25. Tool a surface.
26. Decorate a surface.
27. Select, cut, and bend reinforcing materials.
28. Place reinforcing materials.
29. Remove, clean, and care for forms.
30. Soak and oil forms.
31. Cure surfaces and protect concrete work.
32. Test sand.
33. Wash sand and gravel.
34. Sieve or screen materials.
35. Grade aggregates.
36. Lay out foundations.
37. Excavate for foundations and footings.
38. Block out surfaces, as in sidewalks.
39. Set grade boards.
40. Bond new surface to an old.
41. Place footings, sub-base, or foundations.

The Things the Student Should Know:

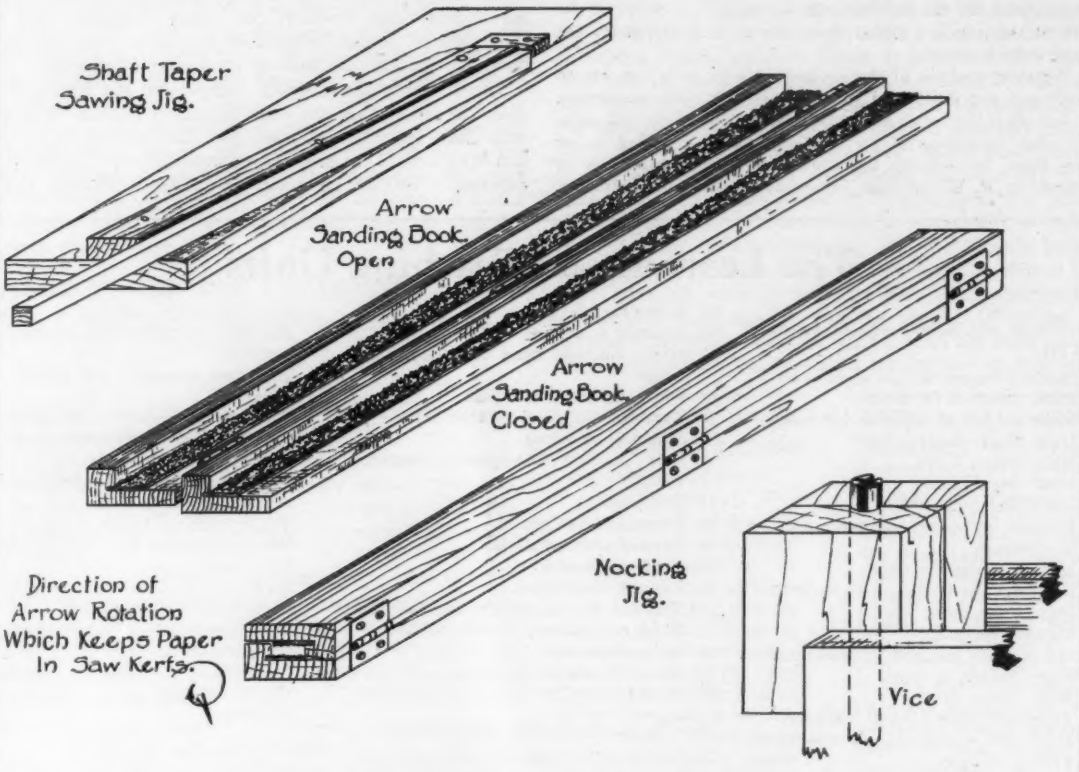
1. Names of the tools used in cement and concrete work.
2. Sizes and styles of reinforcing materials.
3. The chemical reaction of cement in forming concrete.
4. How cement is manufactured.
5. How cement is packed and sold.
6. How concrete is tested.
7. The effect of rapid drying on cement or concrete.
8. The time required for setting and curing.
9. The principal causes of failure in concrete and how to overcome them.
10. How to grade aggregates.
11. The development of cement and its principal uses.
12. The principal materials used for forms.
13. How to estimate the materials needed for a job.
14. How to calculate the weight and strength of concrete.
15. The effect of adding coloring materials to cement work.
16. Occupational information concerning the cement industry and concrete construction.

What the Student Should Be:

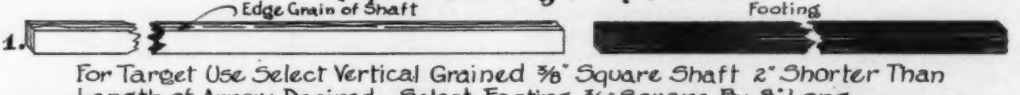
This list of attitudes and habits which contribute to the success of individuals in any vocation was given on page 191 in the May, 1931, issue of this magazine, and need not be repeated here.

ONE OF THE MEMORIAL MURALS, TILDEN TECHNICAL HIGH SCHOOL, CHICAGO, ILLINOIS

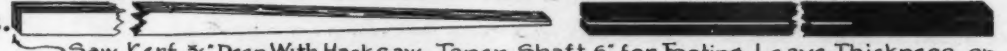
Arrow Making Aids


Shaft Taper Sawing Jig.
Arrow Sanding Book Open
Arrow Sanding Book Closed
Direction of Arrow Rotation Which Keeps Paper In Saw Kerfs.
Nocking Jig.
Vice

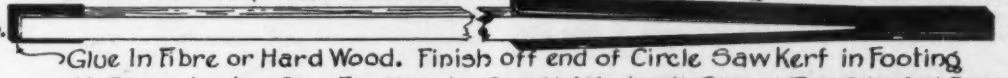
Steps in Making Footed Arrows



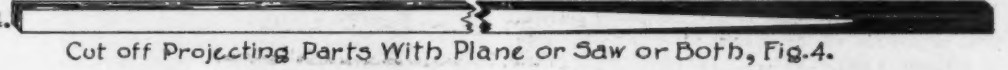
1. For Target Use Select Vertical Grained 3/8" Square Shaft 2" Shorter Than Length of Arrow Desired. Select Footing 3/8" Square By 8" Long.



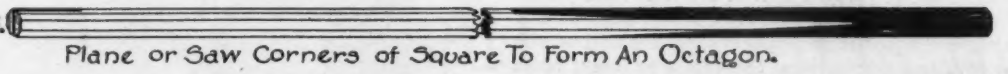
2. Saw Kerf 3/4" Deep With Hacksaw. Taper Shaft 6" for Footing. Leave Thickness on End of Shaft Same As Width of Cut for Footing. Cut Footing 6" With Thin Circle Saw.



3. Glue In Fibre or Hard Wood. Finish off end of Circle Saw Kerf in Footing At Right Angle. Glue Footing to Shaft, Wind With String, True Job & Let Dry.

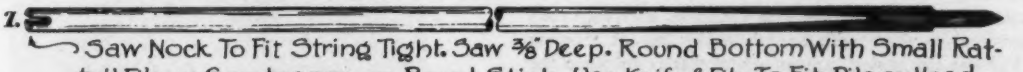


4. Cut off Projecting Parts With Plane or Saw or Both, Fig. 4.

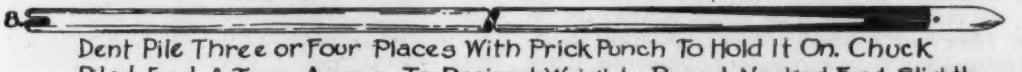


5. Plane or Saw Corners of Square To Form An Octagon.

6. Turn Octagon To Largest Possible Rough Round By Inserting Pile End Into Lathe Drill Chuck or Chuck On Motor & Then Sand With Book.

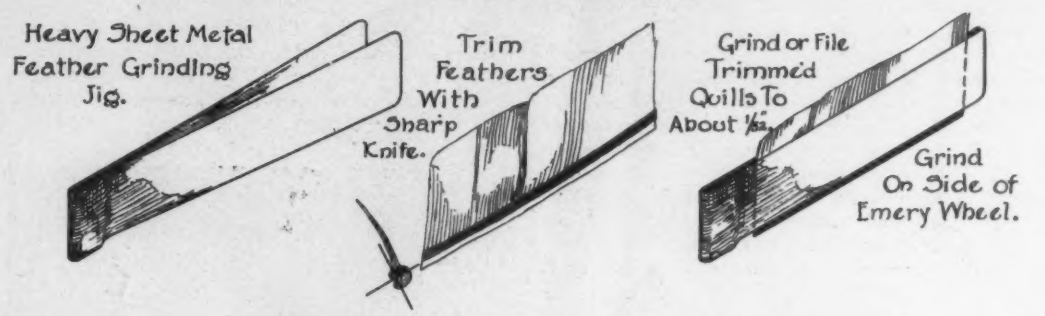


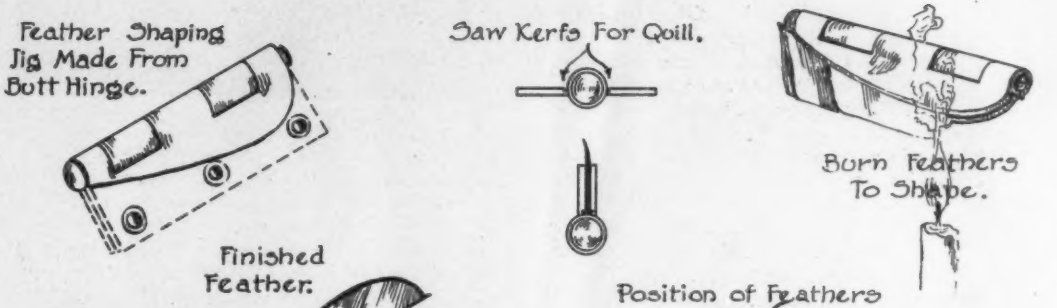
7. Saw Nock To Fit String Tight. Saw 3/8" Deep. Round Bottom With Small Rat-tail File or Sandpaper on Round Stick. Use Knife & File To Fit Pile or Head.



8. Dent Pile Three or Four Places With Prick Punch To Hold It On. Chuck Piled End & Turn Arrow To Desired Weight. Round Nocked End Slightly.

Feather Preparing Aids

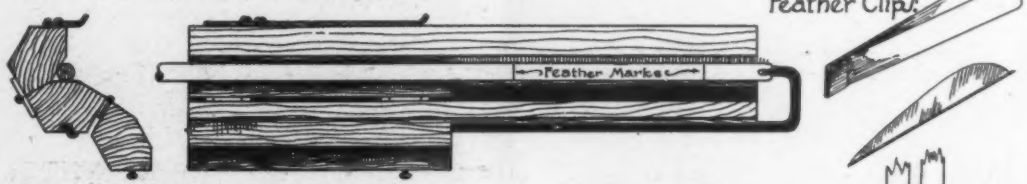

Heavy Sheet Metal Feather Grinding Jig.
Trim Feathers With Sharp Knife.
Grind or File Trimmed Quills To About 1/32"
Grind On Side of Emery Wheel.

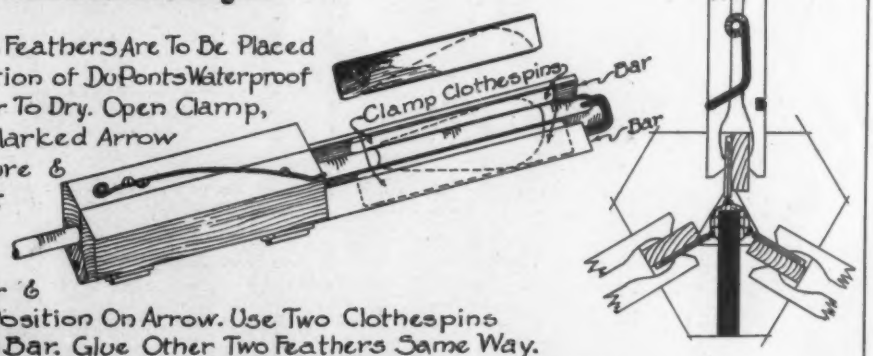

Feather Shaping Jig Made From Butt Hinge.
Saw Kerfs For Quill.
Burn Feathers To Shape.
Finished Feather.
Use Only Stiff One-Sided Feathers From Wing Tip.
About Twelve Good Feathers From One Turkey.
Position of Feathers On Arrow.
Cock Feather
Use Feathers From Same Side of Bird So Arrow Will Spin.

Feathering Clamp

Can Be Made From One 3½" Equilateral Triangular Piece 11" Long Or Three Pieces 1⅝" x 1¾" x 11".

Make Three Thin Sheet Metal Feather Clips.





Coat Arrow Where Feathers Are To Be Placed With Thin Application of DuPonts Waterproof Glue. Allow ½ Hour To Dry. Open Clamp, Place Feather Marked Arrow As In Above Figure & Close Clamp. Put Cock Feather In Clip, Apply Glue To Feather & Place Both In Position On Arrow. Use Two Clothespins To Clamp Clip To Bar. Glue Other Two Feathers Same Way. In 5 Minutes Remove Pins & Clips, Open Clamp & Remove Arrow.

ARROW MAKING

Ken. F. Shepardson, La Crosse, Wisconsin

Enthusiasm for archery will be increased when some of the guesswork is taken out of the probable destruction of the speeding arrow. The single-piece or self-arrow is good enough for beginners and for most boys though it is unmatched in weight. However, for careful target work the matched footed arrow is essential. The maximum of accuracy from unmatched self-arrows is soon reached by the beginner and interest in the sport lags if better groups on the target are not possible.

There will be some pupils who will be capable of making a very nice set of footed arrows after they become dissatisfied with the results obtained from their learning tackle. These boys will be the ones who will continue to follow archery as a hobby if at this point they are given the chance to make better and more accurate arrows.

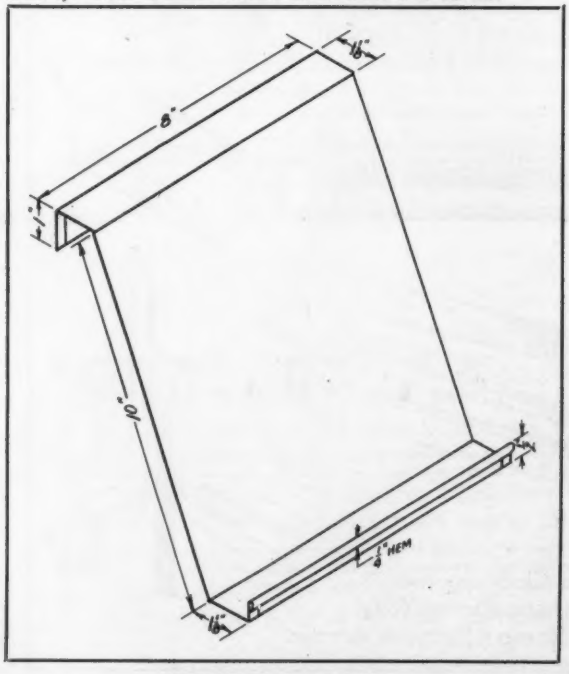
The only extra work involved is the long fish-tail splice of footing and shaft and the careful matching on a set of scales borrowed from the chemistry department or from an apothecary or jeweler. A smooth finishing saw and a taper jig will take care of the splice. The splice may be wrapped with string until the glue is dry.

The sanding book is a necessity for accurate work. An arrow length book with No. 3 garnet floor sandpaper is the best for turning the octagon down to a rough round. Shorter books with regular sheets of finer sandpaper can be used for finishing. A little care should be exhibited in sanding, as too much heat at the splice will soften the glue. Arrows should be matched within two grains in weight.

Feathers may be prepared in several ways. Any way is difficult enough. The method of stripping the feather from the quill is easier than trimming with a knife, but the feather which has been stripped has a tendency to curl and is hard to handle. The method of grinding or filing after rough cutting with a knife is the easiest way and the feather keeps its shape much better.

The feather-shaping jig made from a butt hinge keeps feathers uniform and speeds up the work.

The feathering clamp will space feathers accurately on the arrow and will do away with pins and string for gluing. The clamp is a decided aid. It is being used by many fletchers to increase speed and uniformity of work. No school shop where archery tackle is made should be without this device.



INSTRUCTION-SHEET RACK

INSTRUCTION-SHEET RACK

Alfred B. Grayshon, J. Cooke Junior High School, Philadelphia, Pennsylvania

The accompanying illustrations show a bench rack for holding instruction sheets. The racks are made of No. 24 galvanized or black iron 8½ by 14 in. hemmed on the two sides and one end and then bent to shape. The top end hooks over a standard bench back 9 in. high.

INSTRUCTION RACKS

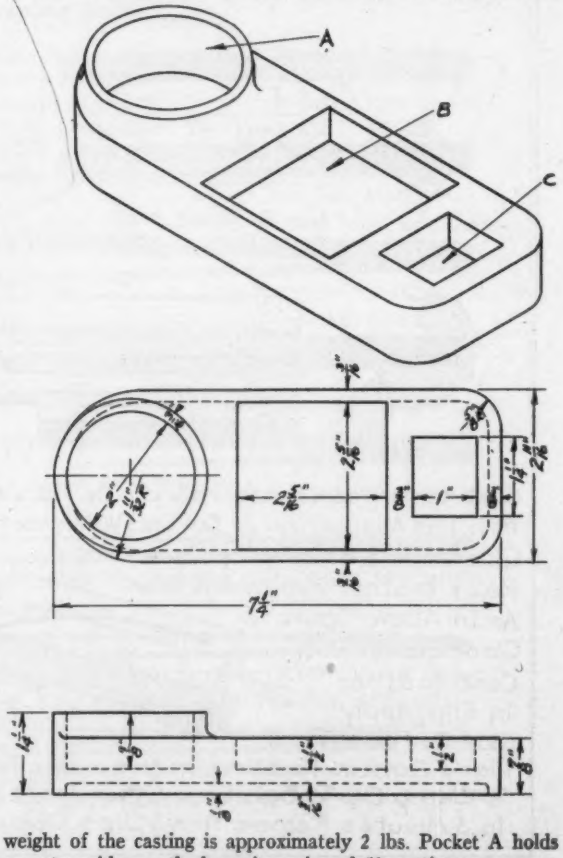
A rack of this type will hold any mounted sheets or reference books so that the boy can conveniently see the instructional material without having it interfere with his work.

To get the greatest benefit out of this rack, mount all blue prints and sheet information on stiff cardboard or sheet metal and give it a coating of white shellac.

SOLDERING-BENCH HOLDER

Alfred B. Grayshon, J. Cooke Junior High School, Philadelphia, Pennsylvania

The project described herewith has been found exceedingly useful. It consists of a casting with 3 depressed pockets. The



weight of the casting is approximately 2 lbs. Pocket A holds an extra-wide-mouthed specimen jar of 50 centimeters capac-

WR

Tracing Supplement No. 237, March, 1932
Industrial Arts and Vocational Education

To be Reprodu
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PEWTER SOLDERING METHODS

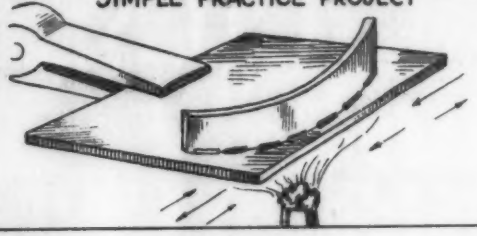
TOOLS & MATERIAL FOR PEWTER SOLDERING.

ALCOHOL LAMP - *CAN BE MADE OF NEW OIL CAN*
FLUX - *ONE OZ. GLYCERIN & 10 DROPS HYDROCHLORIC ACID*
50-50 SOLDER, *IN WIRE FORM*
60-40 " " " "

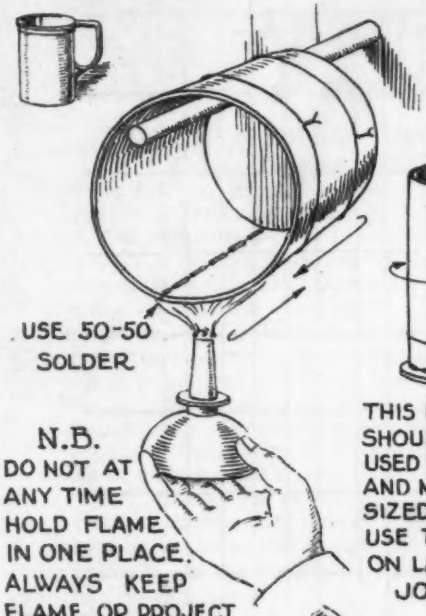
FINE STEEL WOOL
BLOW PIPE
ANNEALED IRON WIRE
FLAT NOSE PLIERS
TWEEZERS

CHARCOAL BLOCKS
WIRE NIPPERS
SMALL TIN SHEARS
WIRE CLIPS - *LARGE AND SMALL of SOFT IRON WIRE.*

SIMPLE PRACTICE PROJECT

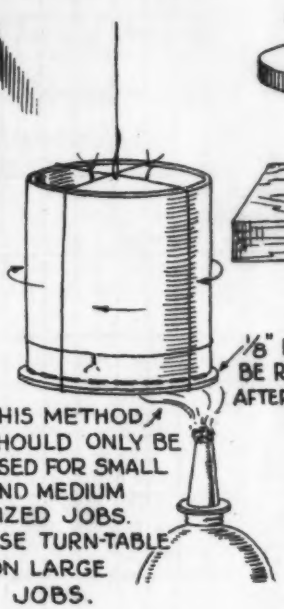


AFTER LOOKING OVER THIS SHEET IT W
TO TAKE TWO PIECES OF PEWTER AS
PRACTICE ON. THIS GIVES ONE A
IDEA HOW SOLDER ACTS AND HOW
FOR THIS TYPE OF WORK. BY CURVIN
PIECE IT WILL STAND OF ITS OWN A
NOT BE CLAMPED. THE SOLDER W
AFTER THE FLUX BEGINS TO BOIL.
TO FORCE THE HEATING. USE PLENTY
SURE TO KEEP PEWTER MOVING O



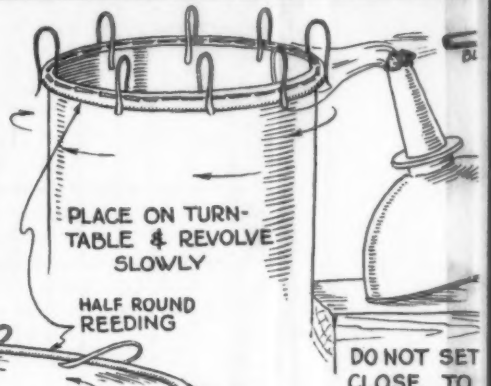
USE 50-50 SOLDER

N.B.
DO NOT AT ANY TIME HOLD FLAME IN ONE PLACE. ALWAYS KEEP FLAME OR PROJECT MOVING, AS THE CASE MAY BE.

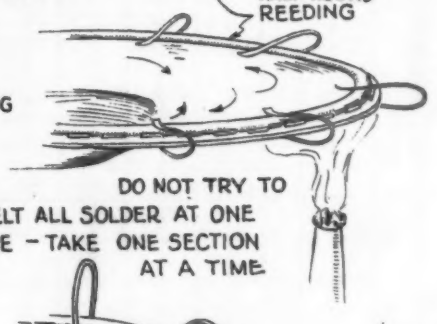


LATHE FACE-PLATE
IRON ROD OR DOWEL
TURN-TABLE
⅛" LIP TO BE REMOVED AFTER SOLDERING

THIS METHOD SHOULD ONLY BE USED FOR SMALL AND MEDIUM SIZED JOBS. USE TURN-TABLE ON LARGE JOBS.



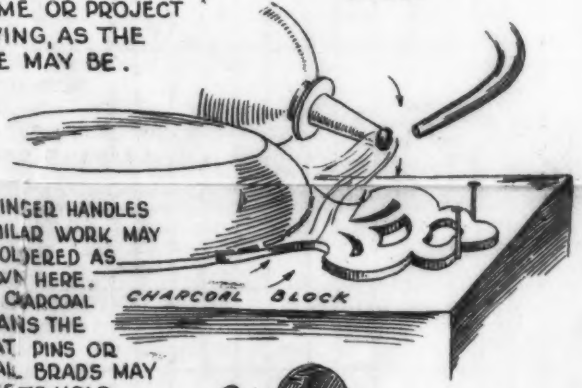
PLACE ON TURN-TABLE & REVOLVE SLOWLY



HALF ROUND REEDING

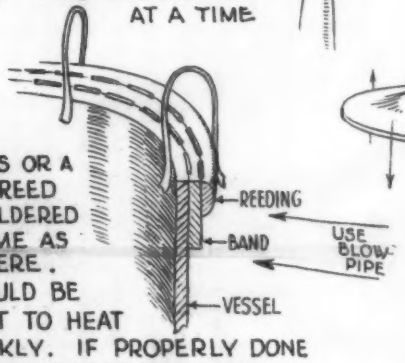
DO NOT TRY TO MELT ALL SOLDER AT ONE TIME - TAKE ONE SECTION AT A TIME.

DO NOT SET
CLOSE TO
YOU MAY PA
MOMENT — AN
TAKE MUCH H



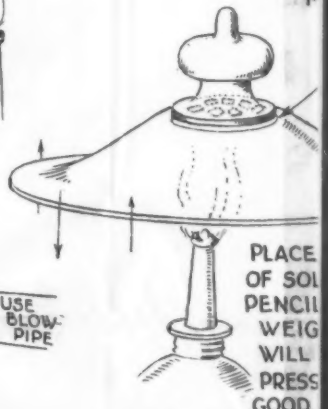
PORRINGER HANDLES & SIMILAR WORK MAY BE SOLDERED AS SHOWN HERE. THE CHARCOAL RETAINS THE HEAT. PINS OR SMALL BRADS MAY USED TO HOLD PARTS TOGETHER

CHARCOAL BLOCK



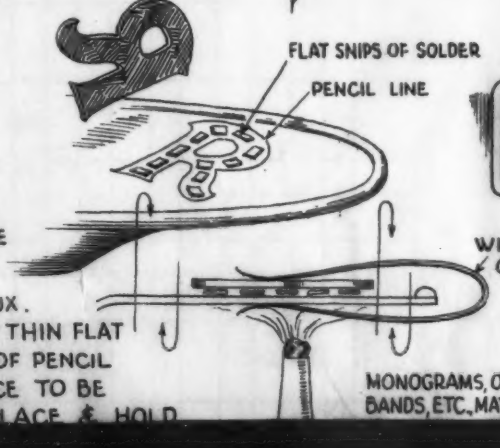
TWO BANDS OR A BAND & A REED CAN BE SOLDERED AT ONE TIME AS SHOWN HERE. CARE SHOULD BE TAKEN NOT TO HEAT TOO QUICKLY. IF PROPERLY DONE BOTH LINES OF SOLDER WILL FLOW AT ABOUT THE SAME TIME.

REEDING
BAND
USE BLOW PIPE
VESSEL



PLACE
OF SOL
PENCIL
WEIG
WILL
PRESS
GOOD

COVER IS HELD
POSITION. IF A
GO ON BOTTOM
SHOULD BE PU
& CLIPS LEFT IN
UNTIL AFTER KN
ON. (SEE LOWER L

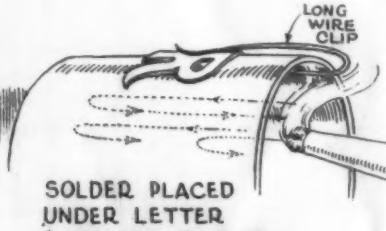


FLAT SNIPS OF SOLDER
PENCIL LINE
WIRE CLIP

PLACE INITIAL IN POSITION & RUN PENCIL LINE AROUND.

USE PLENTY FLUX. PLACE SNIPS OF THIN FLAT SOLDER INSIDE OF PENCIL LINES. LAY PIECE TO BE APPLIQUED IN PLACE & HOLD

PLATE BY W. BEN HUNT



LONG WIRE CLIP

SOLDER PLACED UNDER LETTER & TREATED SAME AS ILLUSTRATED AT LEFT

MONOGRAMS, ORNAMENTS, BANDS, ETC., MAY BE OF

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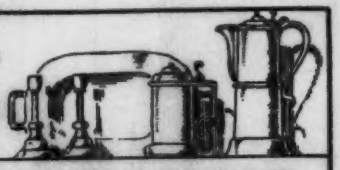
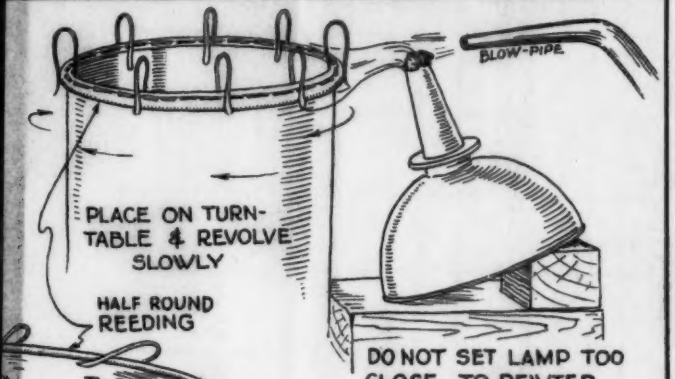
METHODS



AFTER LOOKING OVER THIS SHEET IT WOULD BE WELL TO TAKE TWO PIECES OF PEWTER AS SHOWN AT LEFT TO PRACTICE ON. THIS GIVES ONE AN EXCELLENT IDEA HOW SOLDER ACTS AND HOW MUCH IS REQUIRED FOR THIS TYPE OF WORK. BY CURVING THE SMALLER PIECE IT WILL STAND OF ITS OWN ACCORD & NEED NOT BE CLAMPED. THE SOLDER WILL FLOW SOON AFTER THE FLUX BEGINS TO BOIL. DO NOT TRY TO FORCE THE HEATING. USE PLENTY FLUX AND BE SURE TO KEEP PEWTER MOVING OVER FLAME.



DO NOT SET LAMP TOO CLOSE TO PEWTER. YOU MAY PAUSE FOR A MOMENT—AND IT DOESN'T TAKE MUCH HEAT TO MELT PEWTER

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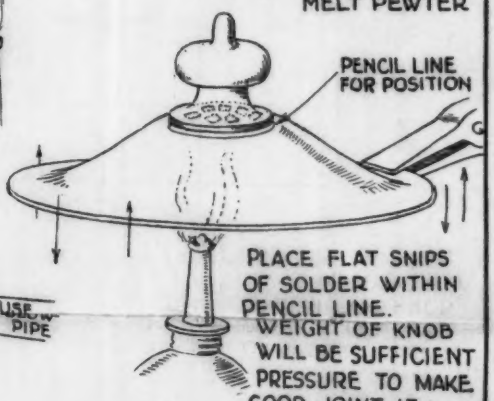

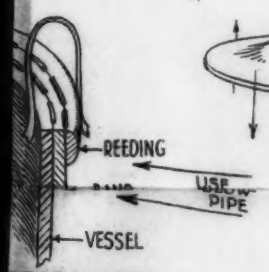

PLACE FLAT SNIPS OF SOLDER WITHIN PENCIL LINE. WEIGHT OF KNOB WILL BE SUFFICIENT PRESSURE TO MAKE GOOD JOINT IF COVER IS HELD IN HORIZONTAL POSITION. IF A RING IS TO GO ON BOTTOM OF LID, IT SHOULD BE PUT ON FIRST & CLIPS LEFT IN PLACE UNTIL AFTER KNOB IS SOLDERED ON. (SEE LOWER LEFT HAND CORNER)

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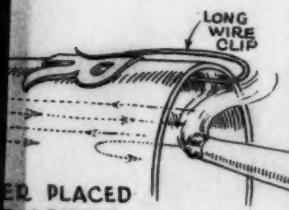

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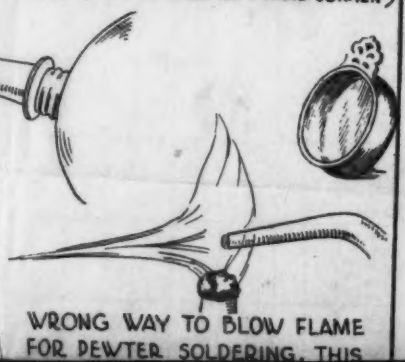

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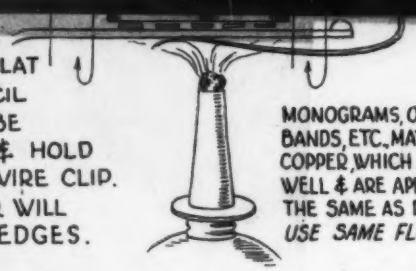
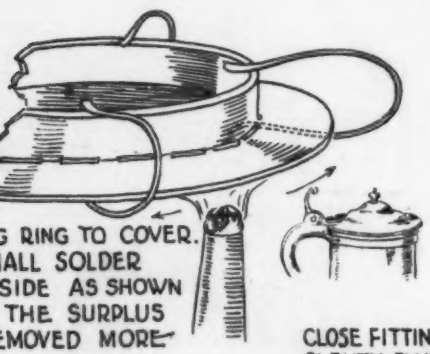


ILLUSTRATED AT LEFT

MONOGRAMS, ORNAMENTS, BANDS, ETC., MAY BE OF COPPER, WHICH LOOK WELL & ARE APPLIED THE SAME AS PEWTER *USE SAME FLUX.*

WRONG WAY TO BLOW FLAME FOR PEWTER SOLDERING. THIS MAKES TOO INTENSE A HEAT.



G RING TO COVER.
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FOR A SHORT SPOUT THIS METHOD WILL BE FOUND BEST, BECAUSE IT IS QUITE SIMPLE TO FILE AWAY THE SURPLUS METAL. BUT ON LONG OPEN SPOUTS OR TEAKETTLE SPOUTS, WHERE NO FILING CAN BE DONE AFTER SOLDERING, THE HOLE SHOULD BE MADE TO CORRESPOND WITH THE SPOUT AND THE SOLDER SNIPS PLACED ON THE OUTSIDE

CORRECT WAY TO BLOW FLAME FOR PEWTER SOLDERING. *KEEP END OF BLOW PIPE OUT OF FLAME.*

CLOSE FITTING JOINTS & CLEAN METAL ARE ESSENTIAL. " CLEAN JOINTS WITH FINE STEEL WOOL. " USE PLENTY FLUX. " SOLDER FLOWS TOWARD HEAT. " DO NOT USE TOO MUCH SOLDER AS IT ONLY RESULTS IN EXTRA WORK AND A SLOPPY JOB. " NEVER HOLD FLAME STILL. " ALWAYS KEEP MOVING IT. "
ER SNIPS SHOULD BE ABOUT 1/32" SQ. BY 1/8" TO 3/16" LONG FOR ORDINARY WORK & PLACED 1/16" APART. " USE ANNEALED IRON FOR TYING & FOR CLIPS. " DO NOT TIE TOO TIGHT. IT WILL DENT THE PEWTER. " WHERE MORE THAN ONE SOLDERING ATION IS USED, START OUT WITH 50-50 SOLDER AND THEN USE 60-40. IN THIS WAY THE FIRST JOINTS WILL NOT OPEN UP.

Submitted by W. Ben. Hunt, Hales Corners, Wisconsin

ity and 60 millimeters in diameter. This jar is used for the flux in the shape of killed acid. The brush for spreading the acid is held in a No. 6 rubber cork. If soldering paste is used instead of the acid, the metal container in which the soldering paste is bought also will fit into pocket A. Pocket B holds a square ¼-lb. block of sal ammoniac. Pocket C is large enough to hold a short piece of bar solder. With a holder of this kind on the soldering bench, the needed materials are always on hand and the bench can be kept more orderly.

The holder may also be made with another cavity similar to A at the opposite end so that two flux bottles may be accommodated either to take care of two boys or to give the person who is soldering access to one bottle of killed acid and another bottle of raw acid. If two types of acid are to be used, suitable distinguishing colors may be applied to the two bottles.

AMONG INDUSTRIAL-ARTS TEACHERS

DEATH OF MR. EDMINSTER

Mr. C. Franklin Edminster, a member of the faculty of Pratt Institute, and well known as an instructor and supervisor of architectural drawing, died suddenly on January 25. Mr. Edminster went to Pratt Institute in 1888 as an instructor in mechanical drawing in the high school and instructor in architectural construction and design in the art school under Walter Scott Perry.

Coming from the Massachusetts Normal Art School where he had been for two years, with a period of study in Europe, Mr. Edminster had been a large factor in the later growth of the art school, especially in the department of architecture. As instructor in architectural construction and later as supervisor of the department of architecture, he gave freely of his time, energy, and knowledge, both day and evening.

Mr. Edminster was the author of a number of works and articles on architecture, the best known being *Architectural Drawing* and *Structural Drawing*. During the years of his service he also had charge of the normal classes in architectural drawing.

¶ Mr. Samuel C. Mahood, in charge of shopwork at the Crafton and Ingram School Districts, Pennsylvania, was awarded a master of science degree by the Pennsylvania State College.

¶ Mr. C. E. Foresman, of Appleton, Wis., has been appointed instructor in public accounting in the vocational school at Fond du Lac, Wis.

¶ Mr. V. E. Anderson, of Watertown, Wis., has been elected president of the Wisconsin chapter of the International Association of Electrical Inspectors. Mr. John E. Wise was made secretary-treasurer.

¶ Mr. H. E. Richardson was reëlected president, and Mr. E. L. Rice, vice-president, of the Cape May county vocational board of New Jersey.

¶ Mr. Douglas Lincoln has been appointed instructor in machinery and woodworking in the Industrial High School, Albany, N. Y.

¶ Mr. John J. McNally, formerly instructor in the Part-Time School at Albany, N. Y., has been appointed instructor in printing in the Industrial High School.

¶ Mr. H. A. West has been appointed teacher of general woodwork and metal work at the Stonewall Jackson Junior High School, Oklahoma City, Okla.

¶ Mr. L. S. Lannen teaches general woodwork in the William Howard Taft Junior High School, Oklahoma City, Okla.

¶ Mr. John D. Storm, of Scranton, Pa., has been appointed as a vocational supervisor for the state education department.

¶ Mr. A. M. Bratland, of Beaver Dam, Wis., has accepted a position as instructor in drafting in the Riverside High School, Milwaukee, Wis.

¶ Mr. Atland Olson and Mrs. Elizabeth DeClerc were recently reëlected to the vocational school board at Green Bay, Wis.

¶ Mr. B. H. Hardy has been reëlected as secretary-treasurer of the Georgia Industrial College, of Barnesville, Ga.

¶ Mr. W. B. Hill, an instructor in the high school at La Porte, Ind., has been elected president of a new organization of industrial-arts teachers of the fourth district of the state. Other officers are Mr. Ray Peck, Kokomo, vice-president, and Mr. F. E. Leap, secretary-treasurer.

ASSOCIATION AND CONVENTION NEWS

VOCATIONAL SOCIETY OF BOSTON HOLDS MEETING

The Vocational Education Society, of Boston, held its regular monthly meeting on Saturday, December 12, at the Hotel Westminster, Boston. The meeting was attended by 81 members. It took the form of an "old-timer's" night, with eight former presidents of the society attending as guests. Following brief reviews of the history of the society, which was established in 1897, Rev. Bruno Bitter, S.J., vice-president of the University of Tokio, talked on "Russia and the Five-Year Plan."

Father Bitter, who spent part of 1930 in Russia, declared that there is no such thing as private property in Russia and that anyone leaving the country must take nothing with him. As a matter of fact, Russian citizens are forbidden to leave the country and the border is guarded. There is no real family life. The man and wife both work and are economically independent of each other, while the children after 3 years of age belong to the government.

Commenting on education, he said it is necessary to consider both elementary and higher education separately in order to obtain a true comparison between old and new Russia. Elementary education has improved over 80 per cent, but higher education has been very much retarded. The government has the responsibility of educating the children of the country, but only 25 per cent of them ever receive an education, due to the fact that there are not sufficient schools to accommodate all of the children. Father Bitter was of the opinion that Russia is going backward in civilization because it has thrown out the three essential elements in the life of a country, and that the country is facing failure unless the program of the country is radically changed. — *Louis A. Van Ham.*

VOCATIONAL EDUCATION SOCIETY OF BOSTON HOLDS JANUARY MEETING

The Boston Vocational Education Society held its annual get-together meeting at the Hotel Westminster, Boston, on Saturday, January 9. There were 150 members present.

Following the dinner, Dr. A. C. Dieffenbach, editor of the *Christian Record*, spoke on the subject "A Merry Heart Doeth Good." Dr. Dieffenbach pointed out that a great deal of friction might be avoided if people would keep smiling. Much of the teacher's work, he said, should be spiritual, for children are not good simply because of rules and laws, but because they desire to be good. Religion, he said, is such a great power

for good, because it is spiritual. Dr. Dieffenbach pointed out that out of the period through which the world is just passing, no doubt much good will evolve. In support of this, he cited some of the great movements which followed periods of depression.

At the close of the talk, prizes were awarded to the holders of lucky numbers, and each person present received the traditional bag of souvenirs. The meeting adjourned at 10:30 p.m. — *Louis A. Van Ham.*

MICHIGAN INDUSTRIAL-EDUCATION TEACHERS MEET AT FLINT

Vocational, industrial, and industrial-arts teachers of Michigan will be interested in the program for the spring meeting to be held April 14 to 16 at Flint. The headquarters of the meeting will be the Durant Hotel.

Three nationally known speakers, Dr. Charles A. Prosser, Bishop F. B. Fisher, and Prof. Arthur B. Mays, will appear on the program.

A number of round-table discussions and sectional meetings for different departments have been arranged. There will be special shop trips, and the "Ship" as usual will provide prizes. This is the one state meeting of the year when industrial teachers of the state have an opportunity to discuss the work of their own department.

Further information may be obtained from Mr. J. R. Short, Central High School, Flint, Michigan.

PENNSYLVANIA INDUSTRIAL-ARTS SOCIETY MEETS AT PITTSBURGH

The industrial-arts and vocational section of the Pennsylvania Education Association held its annual meeting December 29 and 30, at Pittsburgh, Pa. The meeting was held in the auditorium of the Connelley Trade School.

Dr. Anna Y. Reed, of New York University, who opened the meeting, talked on "Vocational Guidance for Girls and Women." The principal address of the morning was delivered by Judge Tensard DeWolf, chairman of the committee on education for citizenship in Pittsburgh, who called attention to the need of more emphasis on social studies in many centers. He suggested that more time be given to the intelligent reading of the newspapers, in order that good citizenship may be emphasized.

At the vocational luncheon in the school cafeteria, approximately 290 persons listened to a talk by Mr. Philip Murray, a member of the Pittsburgh board of education, who talked on mining, pointing out that the average income during the past year for the mine worker in the state was $375, and that at the present time 100,000 of these workers are in need.

Following the luncheon, the teachers were taken on a tour of the trade school.

At the business meeting on the following day, association officers for the year were elected as follows: President, Mr. G. H. Parkes, Williamsport; secretary, Mr. D. Hess, Sunbury. Mr. G. C. Donson, of Washington, was appointed a delegate to the state convention.

At the Wednesday meeting, Mr. R. J. Patterson, of Wilkinsburg, acted as chairman. Mr. John Metz, Editor of the INDUSTRIAL-ARTS AND VOCATIONAL EDUCATION MAGAZINE, spoke on "The Industrial-Arts Program," emphasizing that to be a good teacher one must know something of the history of the movement and of the industrial progress. He mentioned that the program of five, or even two, years ago will not meet the present-day situation and that the program should be changed whenever that becomes necessary. Mr. Paul Cressman, of Harrisburg, explained the work of the Junior Mechanics' Clubs in the western part of the state, and urged teachers to encourage the organization of such clubs in their schools. At the close of the meeting, a state organization of the club was formed, with nine directors to assist in the extension of the work through the state.

The officers of the industrial-arts section for the next year are: President, Mr. F. G. Dennis, Wilkes-Barre; vice-president, Mr. J. W. Martin, Coatesville; secretary, Mr. D. W. Connor, Pittsburgh. — *George C. Donson.*

TULSA MANUAL-ARTS CLUB HOLDS DEBATE ON STANDARDIZATION

The Manual-Arts Club of Tulsa, Oklahoma, at its January meeting, conducted a debate on the question: *Resolved*, That we adopt city-wide standards of attainment in learning units, related information, and shop projects. The speakers for the affirmative were Mr. B. W. Hargis and Mr. C. O. Weger. The affirmative side made the point that with standardization, the child will know what is expected of him, the teacher will know what to teach, and the supervisor will know what is being taught and in that way be able to do a better job of supervising. With a standardization of courses, it will be possible for teachers to pool their ideas, with the result that the most worth-while projects will be presented, the related information will be better organized, more and better teaching aids will be developed, the instruction can be organized on the group basis, and the relative accomplishments of different pupils and teachers can be determined.

Mr. C. L. Hill and Mr. H. E. Miller, who took the negative side, argued for the recognition of individual differences. They held that because no two teachers are exactly alike, if courses were standardized, some boys would have to go without an education. No two shops are alike and some shop projects cannot be standardized, because there are too many factors to be considered in their selection. If learning units are previously determined, there is little interest left in the work for either the pupil or the teacher, since the necessary thinking would be negligible.

In the following discussion, it was conceded that the affirmative side, in favoring standardization, had presented the best arguments. It was brought out that the best argument in favor of city-wide standardization was the effort of the A. V. A. in seeking to standardize shop instruction on a nation-wide scale.

Following the debate and the regular business meeting, the following officers were elected to serve the club for the ensuing semester: Mr. J. J. Frisch, president; Mr. Herbert Detjen, vice-president; and Mr. S. L. Gunderson, secretary-treasurer. — *J. W. Bollinger.*

JUNIOR MECHANICS CLUB ELECTS BOARD OF DIRECTORS

Industrial-arts teachers and teacher trainers of Pennsylvania interested in junior mechanics' clubs, held a meeting in the Schenley High School, Pittsburgh, Pa., on December 30. Mr. P. L. Cressman, of Harrisburg, presided at the meeting, which was attended by approximately 50 teachers.

At this meeting, the teachers elected nine persons to serve on the board of directors. These are: Mr. S. L. Coover, California; Mr. W. E. Steiner, Sunbury; Mr. E. E. Howard, Millersville; Mr. W. K. Monks, Clairton; Mr. C. S. Bauer, Williamsport; Mr. W. A. Swartz, Aliquippa; Mr. F. D. Rohmer, Midland; Mr. D. E. Wilkinson, Corry; and Mr. J. E. Krotzer, Wilkinsburg.

The directors elected officers for the year follows: President, Mr. S. L. Coover, California; vice-president, Mr. W. E. Steiner, Sunbury; secretary, Mr. E. E. Howard, Millersville; treasurer, Mr. W. K. Monks, Clairton.

The next meeting of the board will be held at Eagles Mere, during the coming summer, in connection with the annual vocational conference.

EL PASO INDUSTRIAL-ARTS CLUB MEETS

The regular meeting of the Industrial-Arts Teachers' Club of El Paso, Texas, was held on Saturday, December 5, in the

(Continued on page 15A)

ADVERTISING PAGES REMOVED

(Continued from page 106)

El Paso High School. Committees were appointed to approve new projects submitted for school use and to make arrangements for the annual club banquet. The members of the project committee are Mr. B. W. Tapper, Mr. Geo. Shalkhauser, Mr. F. Roberts, Mr. C. Titus, and Mr. F. Heidelburg.

N.E.A. DEPARTMENT OF VOCATIONAL EDUCATION

The Department of Vocational Education of the National Education Association, which holds its annual meeting in Washington during the week of February 20–25, has announced the program for the sessions to be held at this meeting.

At the first session, Mr. J. D. Blackwell, of Baltimore, Md., will talk on "Trends in Vocational Education"; Mr. Theodore B. Manny, of Washington, D. C., will discuss "Social Trends in American Life"; and Miss Adelaide S. Baylor, of Washington, will take up "Significant Trends and Developments in the Field of Home Economics."

At the second session, Mr. P. H. Smith, of Bayonne, N. J., will talk on "The Need for Technical and Vocational Training of High-School Grade"; Mr. W. A. Sutton, of Atlanta, Ga., will discuss "Society's Obligation to Provide Vocational Opportunities for Employed Youth"; and Mr. A. M. Weaver, of Williamsport, Pa., will take up "Educational Opportunities for the Unemployed."

ADULT EDUCATION MEETING

The Institute of Adult Education will be held April 6–8, at Spokane, Wash., under the auspices of the Inland Empire Education Association. The institute will comprise round tables and discussion groups of the agencies of formal and informal adult education.

NEW PUBLICATIONS

Fifty Alphabets

By W. Ben. Hunt and Ed. C. Hunt. Cloth, 96 pages, 7 by 10¼, illustrated. Price, $2.50. Published by The Bruce Publishing Company, Milwaukee, Wisconsin.

This book contains fifty excellent alphabets together with concise directions for choosing an alphabet for a particular lettering job. While the book is primarily for reference, it will be of great assistance to both the student of commercial art as well as to the commercial designer.

Machine Drafting

By George C. Snow and J. Charles Russell. Cloth, 159 pages 6⅛ by 9¼, illustrated. Price, $1.48. Published by The Manual Arts Press, Peoria, Ill.

This book on machine drafting is designed especially for the machinist apprentice. It contains quite a number of examples taken from everyday school machine-shop problems. It covers the usual sketching and geometrical problems together with a number of problems on the making of detail and assembly drawings.

Automobile Racing

By Ray F. Kuns. Paper, 48 pages, 8¼ by 11⅛, illustrated. Second edition. Price, $1. Published by the author, at Madisonville, Cincinnati, Ohio.

This book contains valuable information on the design, construction, and operation of automobile racing cars. The material provided is intended to assist all those who are interested in the auto-racing game.

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To acquaint yourself or students with the qualities of Douglas Fir Plywood—its sizes, thicknesses, finishing properties, etc.— mail the coupon below for free sample, descriptive literature, and assortment of designs for manual-training projects. These may suggest *new* ideas to you.

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AUTO CAMP KITS: *Only one of a number of lightweight, unbreakable cabinets easy to make with Douglas Fir Plywood. Inexpensive, yet attractive, and with strength for years of hard service.*

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It comes in standard widths beginning at 12" and increasing by 2" units to 48". Standard lengths are: 48", 60", 72", 84", 96". Standard thicknesses are: 3/16", 1/4", 3/8", 1/2", 3/4"— others upon special order.

The two main classes of Douglas Fir Plywood are *Wallboard* and *Cabinet*. Wallboard grade is 1/4" thick, specially suited for interior walls, ceilings, wainscoting and similar uses. Cabinet grades come in various thicknesses, economical for built-ins such as cupboards, closets, breakfast nooks, bookcases, partitions, screens, display fixtures, cabinets, modern furniture and similar uses.

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REAL LUMBER
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3 You need not make a finished working drawing unless you wish—just clear "idea sketches" are enough, either in elevation or in perspective, with indications of dimensions.

4 You are not limited as to the *variety* of uses you may suggest. For example, you may design Plywood walls and objects for a whole room — such as a boy's study, recreation room, child's playroom, etc.— or you may design Plywood fixtures and built-ins, such as wardrobes, breakfast nooks, bookcases, radio cabinets, store displays, filing compartments, office conveniences, etc.

5 For every usable sketch employing Douglas fir plywood we will pay you twenty-five dollars cash, otherwise returning your sketches if return postage accompanies them. If in addition to your sketch, or plan, you care to send us a photograph of your design as built, we will pay you five dollars extra—or a total of thirty dollars for each accepted "Idea Sketch." Each sketch purchased becomes the property of Douglas Fir Plywood Manufacturers with right to use it for advertising, publicity, or in any other way.

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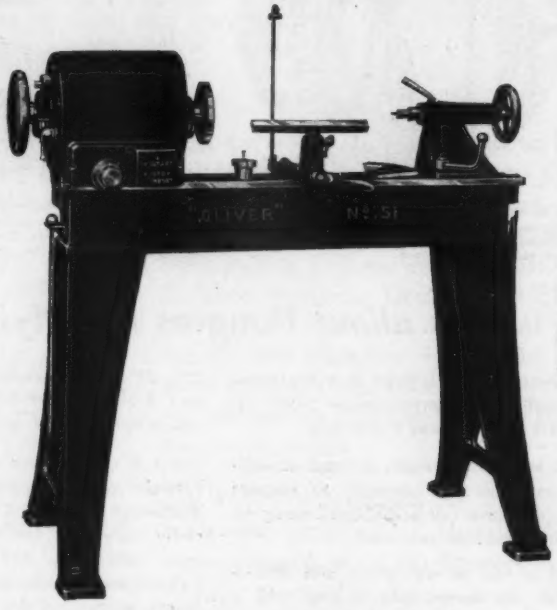
NEW OLIVER FOUR-SPEED MOTOR HEADSTOCK LATHE

The Oliver Machinery Company, Grand Rapids, Mich., manufacturers of woodworking machinery and tools, has just announced a new, improved type of motor headstock lathe. This new lathe, known as the Oliver No. 51, is built in the standard 12-in. size, in various lengths of beds. It will turn 24 in. long between centers on a 48-in. bed, or 36 in. on a 60-in. bed.



The motor and electric speed control of this lathe are built as a single unit, with a "sliding control" so built in that the height of the motor is not increased. The headstock receives its power from a ½-h.p., 600, 1200, 1800, and 3600 r.p.m., continuous rating, ball-bearing type motor. The motor control includes start and stop button, speed-change lever, and overload and low-voltage devices, is built into the housing. The control is arranged so that the start button will stop it at any time, and a permanently attached automatically disengaging spindle-lock also is provided. A mechanical brake with automatic cutout switch completes the details provided for convenience and safety of operation.

Another exclusive feature of this lathe is a patented combination handwheel and faceplate. The new type of headstock used on this lathe also is available for use on old lathes.

NEW DIETZGEN CATALOG

Eugene Dietzgen Company, 2425 Sheffield Ave., Chicago, Ill., has issued its new Catalog No. 30-A, listing its drawing instruments and supplies for school use. The catalog contains descriptions and prices of drawing papers, tracing cloth, blueprint papers, cross-section papers, logarithmic paper, drawing instruments, repair outfits, parts for instruments, geometry and compass sets, blackboard drawing outfits, scales, rules, triangles, curves and T squares.

A copy of the catalog will be sent to any shop instructor who requests it.

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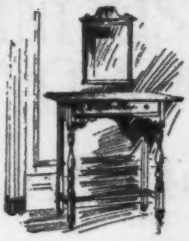

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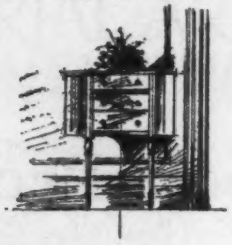

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IAVE NEWS — NOTES

Automotive Motion-Picture Films

A series of educational motion-picture films, describing the automotive and allied industries, has been issued by the U. S. Bureau of Mines, Pittsburgh, Pa. The films picture the production of crude petroleum and the refining and treatment of gasoline; the working of the electric storage battery; the manufacture and care of spark plugs; and the making of lubricants and lubrication.

Janitors' Course at La Crosse, Wis.

A course in janitor-engineering is being given at the vocational school, La Crosse, Wis., under the direction of Prof. C. L. Dean, of the University of Wisconsin extension department. Practically all the public-school and parochial-school janitors enrolled for the course.

Vocational Courses for Unemployed

Special afternoon vocational classes are being conducted in the West and South High Schools, Salt Lake City, for the benefit of unemployed persons in the community. Acetylene welding and automobile repair were preferred by the men, while the women were attracted to domestic science.

Learn Furnace Firing at La Crosse, Wis.

The vocational school at La Crosse, Wis., is offering a course of lectures dealing with domestic heating. The lectures take up conservation of fuel, and methods of firing.